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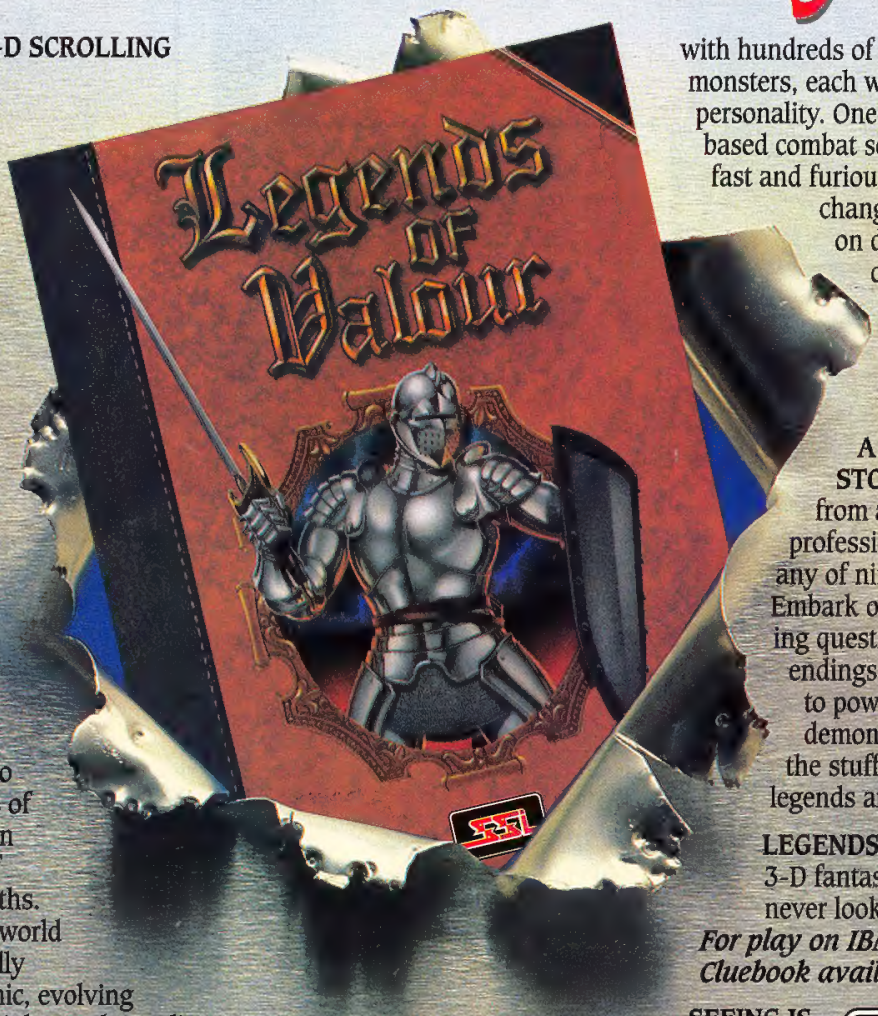

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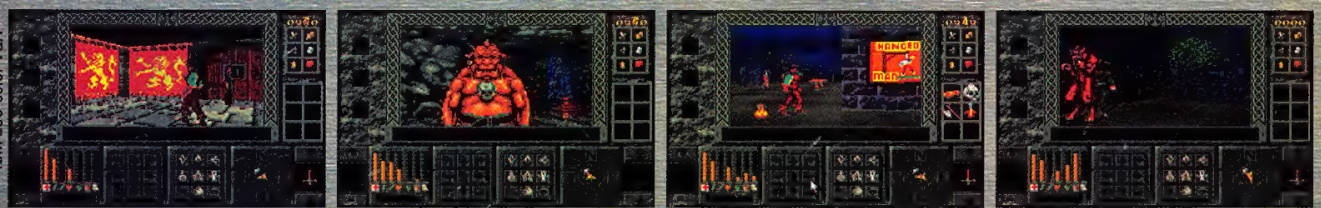

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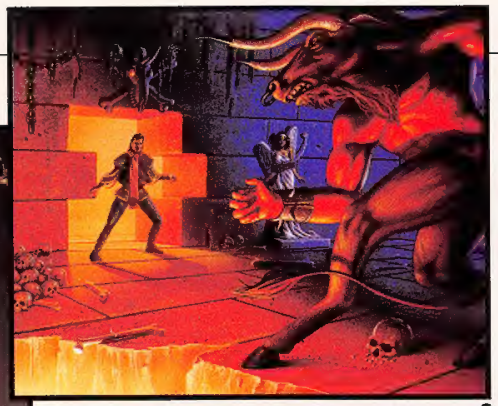
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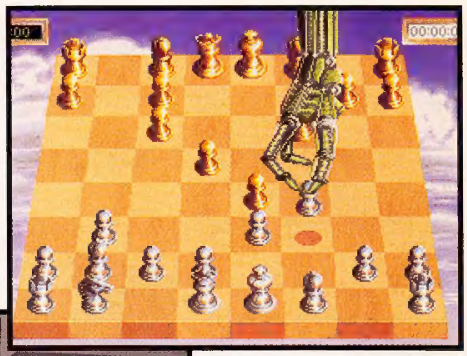
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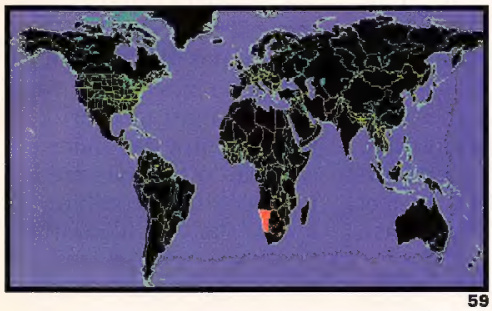
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1992 BUYER'S GUIDE ISSUE

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EDITOR'S NOTES

Welcome to our second annual buyer's guide issue. If you're looking for the top games of the year, you'll find them here. Having reviewed the vast majority of 1992 releases, we decided on 112 titles we recommend to PC gamers. For easy reference, we've organized them into nine categories. Note that our recommendations consist of titles we consider to be good, very good, or outstanding. If we deemed a game to be poorly executed or lacking in play value, you won't find it in this guide. Also, be aware that several games breaking late in the year may not be included here — some of these are likely to be top-quality titles, but we just didn't get a sufficiently early look to feel comfortable putting them in the guide.

Our cover story on the recently released *King's Quest VI* offers a variety of tips for play at several crucial points in the game. Sierra has continued to evolve the King's Quest series with new technologies, and creator Roberta Williams offers her thoughts on this and more in our exclusive interview.

Also in this issue, we have several features that will help you understand a great deal more about the world of PC sound. Our buyer's guide presents available sound cards with specs, and "Anatomy of a Sound Board" cuts through the tech talk to help you determine what all the specs really mean. "MIDI 101" is a basic discussion, and then some, about a feature that most of you have on your sound board, but have probably not explored. With the advent of Windows, the increasing sophistication of sound boards, and more powerful music software, the fascinating world of MIDI is now far more accessible to the average PC user. We think you'll find a lot of solid, useful information here. And Art Director Eddie Malstrom's accompanying illustrations, digitally created, offer an appropriate and attractive high-tech touch.

We hope you enjoy the issue.

Lance Elko
Editorial Director

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LESLIE MIZELL

King's Quest VI

HEIR TODAY, GONE TOMORROW

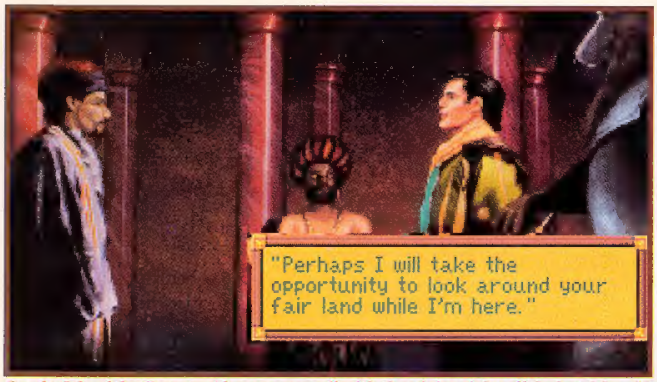
It was obvious from the finale of *King's Quest V* that **Sierra's** next game in the series would involve Prince Alexander and his love-at-first-sight maiden, Princess Cassima. But the course of true love ne'er runs smooth — especially for the reigning family of Daventry.

In *King's Quest VI: Heir Today, Gone Tomorrow*, designed by Roberta Williams and Jane Jensen, Alex's ship has crashed onto the shores of the Isle of the Crown, one of the islands that makes up the mystic Land of the Green Isles. Although he has reached his destination, the land ruled by Cassima's family, Alex has lost everything but a single coin and the signet ring that identifies him as royalty.

Naturally, his first thought is to be reunited with his beloved. But a visit to the castle brings bad news — Cassima's parents have died, Cassima no longer leaves her room, and the vizier (who has taken control of the throne) plans to marry her himself!

King's Quest VI is a huge game, twice as big as *King's Quest V* — and twice as much fun, too. There's much less of the "save character A on screen 2, then character A saves you on screen 3" bartering that was common in the fifth installment. For the most part, Alex gets himself out of his own scrapes in *KQ6*, giving the player more to do.

Once he obtains a magical map, Alex can zap back and forth among the islands, gathering items for spells or solving a couple of involved subquests. *KQ6* was designed so that only half of the game's puzzles need to be solved in order to reach the finale, so the adventure is as accessible for beginners as it is for experi-

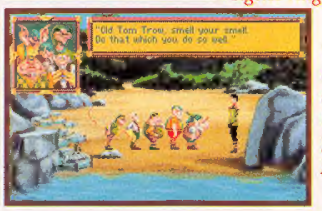


On the Isle of the Crown, Alex squares off with the vizier right off the bat. No self-respecting prince would let the woman he loves marry another.

Is Princess Cassima in her tower room mourning her parents? Or is she a prisoner?

Alex must trade his only item of value for a magic map that allows him to travel freely. Reclaim his signet ring as soon as you can.

The genie periodically pops up in different formations. You'll recognize him because his eyes sparkle like gold.



The Isle of Wonder is home for creatures not usually found this side of the looking glass. The trolls have extra-sharp senses; you must keep each one from finding out you're human.

It's not easy to visit the Isle of the Sacred Mountain. Use your guidebook to solve the riddles, and your mountain goat-like balance to keep from plunging to your death.

enced players. Sierra's icon-based interface, introduced in *KQ5*, works better in this game as well.

Beginning with the two-minute (more than six megabytes) opening cartoon, designed by Stanley Liu of *Batman Returns* fame, the graphics in *KQ6* are terrific. The characters aren't particularly detailed, which boosts the speed of the action, but there are occasional digitized closeups of the major characters. Even better than the graphics is the soundtrack — two full hours of music that truly heightens the game atmosphere. All in all, if *KQ6* is anything to go by, the adventures involving Daventry's royal family are in no danger of losing steam.

The garden has delightful surprises — as long as you don't talk to that bad-tempered tomato. Play a tune for the wall flowers so you can reach Hole-in-the-Wall.

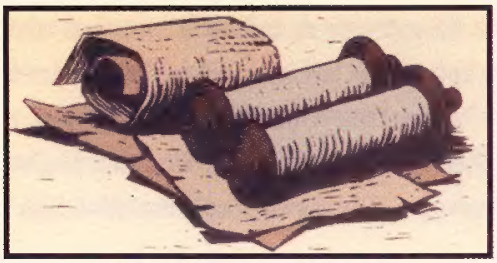
The Isle of the Beast has some bad-tempered residents of its own. To get the swamp ooze you need for one of your spells, urge Bump-on-the-Log and Stick-in-the-Mud fight.

"No visitors have been welcome on the Isle of the Sacred Mountain in years! Not since the red and white queens had pies in the guise of 'friendly visitors' steal our island's sacred golden fleece!"

The guards aren't used to visitors — as is obvious from their friendly greeting.

A ride to the Netherworld is yours if you cast the right spell.

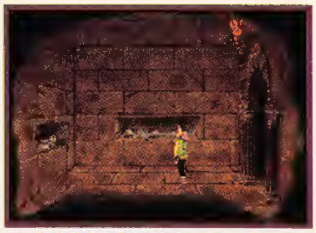
The Isle of Mists may be your final resting place if you don't cast a spell worthy of the Druids' respect.



The Minotaur's Lair

"The minotaur has violated our sacred catacombs and eats our young in sacrifice. Our own daughter, Lady Celeste, was taken there only this morning as his most recently demanded offering!"

One of your sub-quests is to rescue Lady Celeste from the half-man, half-bull Minotaur.



It's helpful to keep save several games as you explore the trap-laden maze. Search for useful items as well, such as the coins on this dead man's eyes.

When you hear the Minotaur in the next room, use Hole-in-the-Wall to spy on him.

Will you send the Minotaur to a fiery death? Or will he send you?

Beauty and the Beast

Beautiful girl. Mean stepmother. Garden of roses. Three guesses as to which fairy tale you must help resolve.

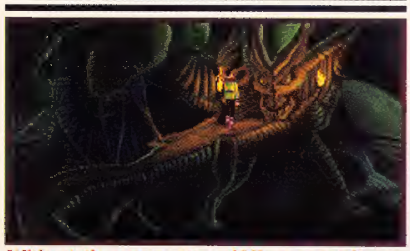
The Oracle tells you of a girl you must rescue, a troubled soul you must save.

The Beast doesn't hold much hope that you can find a woman who would marry him in his present form. But if you tell his story to a soft-hearted girl — and bring her a floral token — she'll go with you willingly.

To Hell and Back Again

In the Netherworld, you learn your suspicions were correct — Cassima's parents did not die a natural death!

You must pay for your passage over the River Styx. If you didn't pick up the coins in the labyrinth, you'd better hope you saved a game back there.



Without the answer to a riddle, you can't pass through this gate. The answer, like the others in the game, is either in the guidebook or on a slip of paper you've found in the game.

You can force a tear from the Lord of Death by showing him the pain and misery he's caused. It's all written on his face.

With time running out, you must get into the castle as fast as possible. If the guards won't let you through, make your own doorway.

Are you too late? Surely Cassima wouldn't marry another if she were in her right mind — or body.

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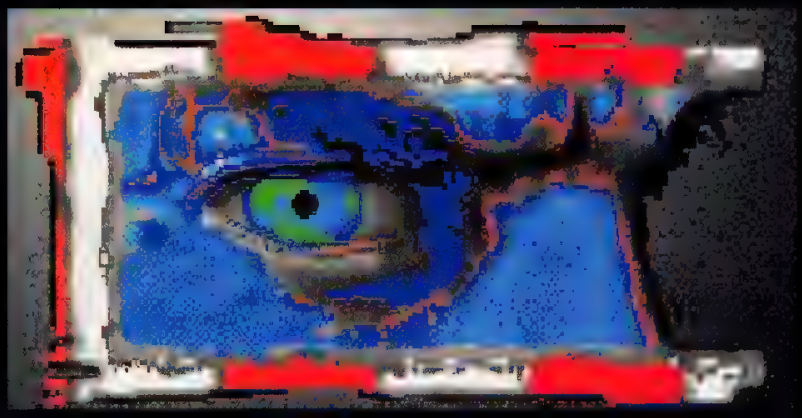

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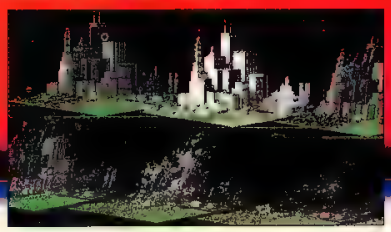

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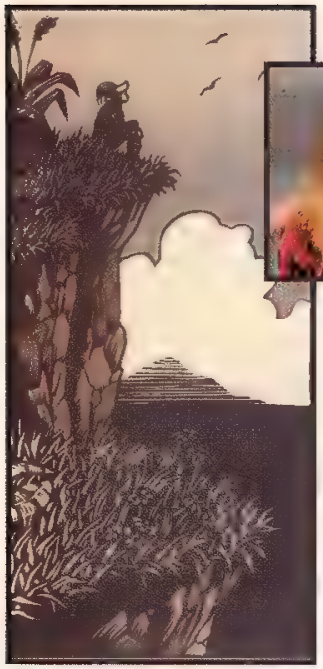

ROBERTA WILLIAMS — THE IMAGINATION BEHIND THE Quest

Since King Graham first donned his adventurer's hat in 1984, Sierra On-Line has sold more than 1.5 million copies of the King's Quest games. A standard for graphic adventures, the KQ series relies on strategy instead of action and, as series creator Roberta Williams says, "old-fashioned values of heroism and truth."

The earliest KQ adventures were filled with allusions to favorite fairy tales. But by the fourth adventure, Williams was running out of widely recognizable stories. Since then she's added themes ranging from classical mythology to *The Wizard of Oz*. There's a lot of *Alice in Wonderland* evident in *KQ6*.

But with *KQVI*, Williams' greatest excitement isn't over storyline — it's with the technological advances used in the game. "There's the 3-D rendered cartoon — and the cartoon in the floppy version isn't *half* the length of the cartoon in the CD version. This game also has scaling characters, characters that size themselves as they go back into the picture. And we video-captured characters in full costume for the closeups."

Williams points out that *King's Quest 5* is a more linear game than her latest. She wanted *KQ6* to have more paths, but she didn't want to create easy and hard modes. "I wanted to see how we could make a game adjust istself to a beginning, intermediate, or advanced player. The best way seemed to be to think of an easiest path through the game, one that just gets you to the end. But if you're a person who pushes and probes, then there are puzzles for you to access. It's up to you.

"*King's Quest VI* can be a relatively hard game because there's a lot of extra stuff to do or see for subplots, and extra points and extra places to go and extra puzzles to solve. It takes twice as long to play as *King's Quest V*."

Another significant change in *KQ6* is that it's the first game in the series not designed exclusively by Williams. "I took on a co-designer for a couple of reasons: I wanted to train Jane [Jane Jensen, the co-designer of *EcoQuest: The Search for Cetus*] because I didn't want Sierra to be dependent on me. Someone else needs to know how to do a 'proper' adventure game. We're all doing a good job from a technology standpoint, but not on design. In my opinion, the best way to learn it properly is side by side. Overall it was a positive experience, and it was very good for the series because Jane brought in some new ideas. She learned a lot, too, and can take what she's learned to help create her new games."

Williams and Jensen designed *KQ6* under the icon-based interface introduced in *King's Quest 5*. Some gamers miss the humor and player control that were so much a part of the earlier text-parser interface, while others appreciate the ease of the icon interface, where it's not as easy to overlook clues.

"The old interface was a real pain from a design standpoint," Williams says. "We got yelled at because it didn't have enough words. It was actually my idea to change over to the icon interface because we felt the international market was going to be — and is — important. We had tried to take our text-interface games over to Japanese and French. The expense was extraordinary, and they just didn't translate right.

"We're also going more into the mass-consumer market. For example, *King's Quest V* will be available on Sega CD. Those types of machines are sold more to families who wouldn't think of getting a *computer* — they just want a really neat game machine. You can't design games that require keyboards if they're going to be played on machines that don't have them. I honestly believe that if we hadn't gone over to the icon interface, if we hadn't bit the bullet and done it, Sierra adventures would die — they'd still be OK now, but in the next year or the year after that...."

However, an even greater change for traditional Sierra adventures is coming in the shape of the CD-ROM. Williams believes that in the next few years there will be a wide variety of CD-ROM-only games. As a matter of fact, she's developing one with her latest project, *Scary Tales*, a "serious horror game."

But what about *King's Quest VII*? "We've done a *King's Quest* every two years, and that's worked out really well," Williams says. "If you do a series every year, people will grow tired of it, but if you wait for three years, people will have forgotten about it. *King's Quest VII* is loosely floating around in my head. I'm thinking about a Rosella adventure, but I might consider Valanice — although to be honest, I don't see her as a character going out and solving adventures, maybe because she's a mom."

GP

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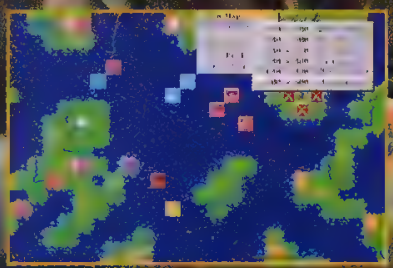

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NEW WORLD COMPUTING

CHESS WARS

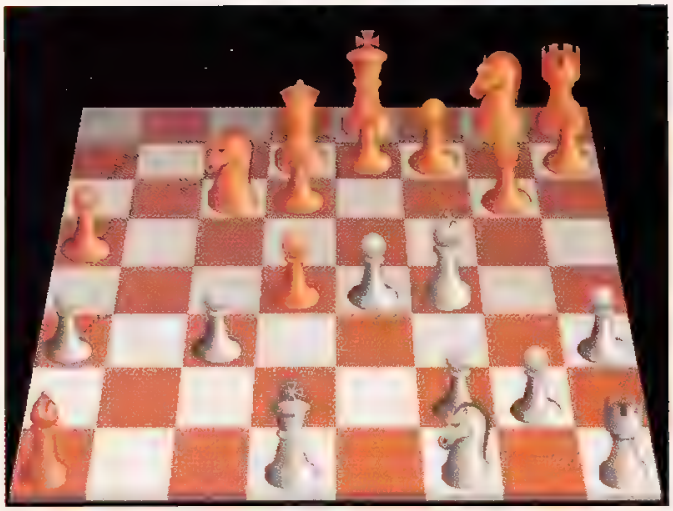
SARGON V, CHESSMASTER 3000, AND GRANDMASTER CHESS GO HEAD TO HEAD

ELLIOTT WINSLOW *INTERNATIONAL MASTER*

It all started with a pretty bold challenge from **Capstone**: If you purchased the company's chess program, *Grandmaster Chess*, and it lost just *one* game to either *Chessmaster 3000* from **The Software Toolworks** or *Sargon V* from **Activision**, Capstone would refund your money.

But the conditions of the challenge are enough to dissuade your average woodpushers from actually putting *Grandmaster* to the test. You must run *Grandmaster Chess* and its challenger on identical computers (who has two *identical* computers?), and send Capstone a printout of the moves along with the certificate *Grandmaster Chess* prints out whenever it's defeated. Capstone then replicates the game and lets you choose between a refund (you must return the program) or a $30 certificate you could use for your next Capstone purchase.

Capstone wasn't alone in making audacious claims. Around the time Capstone issued its chess challenge, Activision began running ads claiming that *Sargon V* had defeated *Chessmaster 3000* in 15 out of 15 games. The ad all but states that these are all the games they played ("And in 15 games, *Chessmaster* threw in the towel every time").



GRANDMASTER CHESS

But wait a minute. How can *Sargon V* win 15 out of 15 against a strong program like *Chessmaster 3000*, and Capstone be so confident that *Grandmaster Chess* would never lose? Such lopsided results would imply huge differences in strength. So we decided to look behind the advertising claims and put *Grandmaster Chess* to the test.

The enhancements and features of these chess programs merit a comparison; indeed, some of these ads *demand* a comparison. Two new directions in chess programs surfaced in these releases, both of which could get more interesting as they mature: instructional modes and guarantees. So before we show you how *Grandmaster Chess* fared against *Sargon V* and *Chessmaster 3000*, let's take a look at chess programs in general and these three in particular.

PLAYING THE MACHINE, NOT THE BOARD

One of the annoyances in playing against chess software is its predictability: Given the same conditions, the program always makes the same decision. It's similar to what you see in *Pac Man* or other video games, where you know *exactly* how the game is going to go at first. It's called a *Tabiya*, or setup, in chess. Advanced players will try their favorite openings, discover a winning line against the program's single defense, and then lose interest.

In more recent chess software, programmers have taken steps to avoid this problem. They might put in a random window (moves within a certain range of evaluation will be chosen arbitrarily), or include different variations in the opening "book" (a cata-

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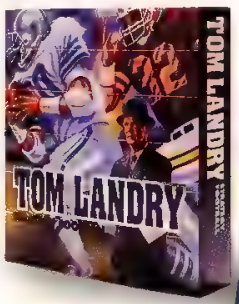

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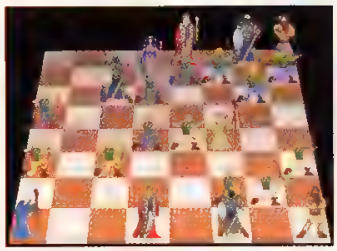
logue of opening moves and strategies developed over the years). This they pretty much have to do anyway, or else the opening play is too boring (see games below).

Grandmaster Chess takes two powerful steps to help the user avoid this situation. First, it offers an option for the user to create opening libraries, beefing up the computer's play in your favorite lines. There's also a "learning" feature in which the program remembers positions in which it eventually discovers that its earlier evaluation was too optimistic. In other words, *Grandmaster Chess* will *try* not to make the same blunder twice! The program can save 1024 of these positions, so eventually it should be able to avoid trouble. You can use this in conjunction with the takeback or replay to quickly get to the heart of a position.

The predictability phenomenon has been used for years by programmers in another way: to guarantee wins against their competitors. Suppose a programmer cracks a competitor's opening book — either by reverse engineering, figuring out the data structure in the opening module, or just by using the window in the program to view its book moves. Now you play into these lines, over and over, looking for lines that lose for you. When you find one, you tweak it by putting in an alternative in the opening book to avoid the loss, just like the "learn" mode of *Grandmaster Chess*.



GRANDMASTER CHESS

SARGON V

This has been done for years in the world of dedicated chess computers. Some machines even had virtually a whole game in their opening books just for certain competitors! When I worked at Heuristic Software from 1986 to 1988, we avoided this sort of thing on principle, preferring to make the opening book interesting for the human player. But before I left, I used the analysis tools we had created to generate a concise report of which lines our opponents played the most and against which we did the worst. Marketing prevailed after my departure, and my replacement created cagier books filled with plenty of traps which ensured that the competition would lose.

I no longer have access to four "referee" computers playing games between chess programs 24 hours a day, so I really can't tell you if this is how *Grandmaster Chess* can be so confident of success, but it's the only way to have the bet locked up, so to speak. And *Grandmaster Chess* has a defense against the same tactic if a *Chessmaster 3050* or *Sargon VI* appears in a few months with similar killer opening lines: its "learning" mode is a great feature which would put the machines back on square one.

Grandmaster Chess plays very well. Winning "every" game against the other two titles doesn't make it the all-around best program, but it does look to be stronger than *Chessmaster 3000* and *Sargon V*. (Due to time constraints, the editors at *PC Entertainment* were only able to pit each program against the other once.) *Grandmaster Chess* was programmed by John Stanback; his previous work, *MChess*, was very tough when I played it in the past, and *Grandmaster Chess* carries on that tradition. I slip up frequently against it.

Then again, I'm not the competitor I used to be, so all three programs will nip me every now and then at speed chess. This is useful for giving me the chance to practice against an opponent that won't let me slide tactically. But for most people it's another story.

INSTRUCTIONAL FEATURES

The average chess player usually gets thrashed quite handily by current chess software, but the bottom line is that the programs and dedicated chess computers still play like -- well, like machines. Since chess programs decide on moves by considering all possibilities and choosing the

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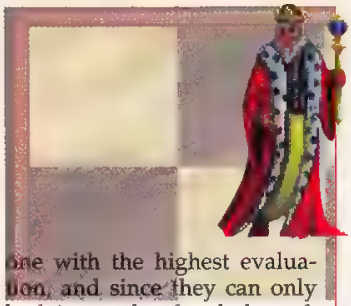

one with the highest evaluation, and since they can only look just so far ahead, they often don't actually find a long-range plan, but move on what can only be called "general principles" — which often makes for feeble opening play. Of course, they can often confound human opponents with the complicated tactics of the middle game, sending them to the Takeback key once a blunder is revealed.

But the latest trend is to turn chess programs into teaching tools. Not long ago, you were lucky if you could see what the computer thought the best move was; now the packages include various hint and analysis modes, full-scale tutorials, and hundreds of illustrative games and positions, with the chance to score and rate yourself. How good are these features? It's a mixed bag.

Sargon V has hundreds of tutorials on openings and positions, as well as a dozen fully annotated games. I prefer the *CM3000* tutorial system, since *Sargon V* requires you to reload the Tutor after every position. And the amount of material in each section of *CM3000* is perfect for one sitting.

But the material in *CM3000* is shaky; it lacks in substance, and there are mistakes. For example, there are two blunders in a row in the section on queening pawns (check out the "skewer" win and consider what happens if Black moves first and supports the h-pawn -- it's a draw, even though the Chessmaster says White can't lose).

On the back of the box for *Grandmaster Chess*, reference is made to a Teaching Mode: "This ever-patient mentor teaches the basic moves, strategies and the complexities of the game." I was unable to find any such mode in the program, and it wasn't mentioned in the manual, either.

SARGON V

NATURAL PLAY

Programmers are also taking steps to make chess software play more "naturally." Most dramatic is *Chessmaster 3000*'s Player Styles Dialogue Box, with sliding scales for Material Points for each piece, Attack-Defense and Material-Positional, Book Depth, etc. Incredibly, there are dozens of pre-created personalities, such as Morphy, Lasker, Capablanca, or Tal, to name a few of the more conspicuous icons of chess history. You shouldn't take these labels too seriously, of course, but the programs are now strong enough (and the hardware so much more advanced) that designers can legitimately incorporate such a feature.

Another attempt at natural play is *CM3000*'s Natural Language Analysis. For someone on my level the information it offers is fairly shallow, but for the majority of users it will be useful — and for the first time it's presented in plain English. (The MPC version of *CM3000* presents the analysis via digitized speech).

STRENGTHS AND WEAKNESSES

Installation is a little game that some programs play better than others; *Grandmaster Chess* completely blows it. You configure *Grandmaster* for graphics and sound support before installation — then it uncompresses *all* 2.6 megabytes onto your hard disk! With a little care I've managed to remove all the files that didn't fit my system, bringing it down to just over a meg, but it was still very annoying. Also, if you change your graphics or sound card, you must re-install rather than changing the configuration from a setup screen.

Chessmaster 3000 and *Sargon V* proceed much more intelligently, but *Sargon V* has a little bug. When you select descriptive notation, it switches kingside and queenside. You play 1. e4, it says 1. P-Q4, and then tells you it's a King's Pawn Opening. Activision has probably received a lot of calls on this one.

Best graphics go to *Grandmaster Chess*, at least in its Super VGA mode. The MS-DOS version of *Chessmaster 3000* (the version I played) boasts highly detailed VGA graphics, but with only 16 colors it doesn't have the rich

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look of *Grandmaster Chess*. *Sargon V*, with its low-res 256-color VGA graphics, places last in the looks department.

Best mouse interface has to go to *Grandmaster Chess*, due mainly to its smooth piece grab. *Chessmaster 3000* and *Sargon V* are more than adequate, but the animated hand of *Sargon V* slows down the game considerably, and *Chessmaster 3000* has a couple of problems — jerky mouse movement when it's thinking, and an analysis window that doesn't fit on the screen, thus obscuring the board.

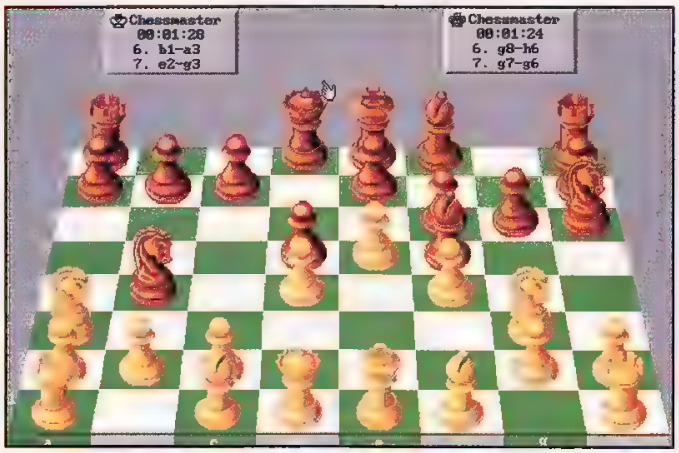
HEAD TO HEAD

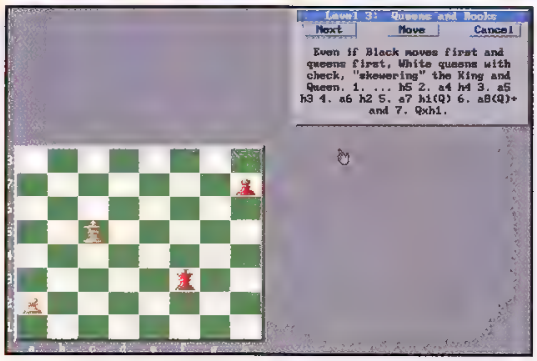
The folks at *PC Entertainment*, realizing that most chess players don't have two identical computers, wanted to see if *Grandmaster Chess* was as good as Capstone claimed, and sent me the results of games between all the programs for analysis. If 15 games is statistically shaky, then three aren't even *close* to being definitive. They do show us, however, just how far chess programs have advanced; these games are actually worth studying.

Grandmaster Chess did win both its games (the moves from those games are reprinted here along with my annotations), and *Sargon V* beat *Chessmaster 3000*. But unless you're a very experienced chess player, all three programs should be able to challenge you for a long time.

This first game displays a number of typical computer strengths and weaknesses. Both sides play the opening haphazardly — like children forced to wear formal clothing — just getting their pieces out and commencing tactical displays. It looks like *Sargon V* is better when it sends a rook to its doom, presumably for a few pawns. But just over the horizon is a slaughter. *Grandmaster Chess* knows about knight outposts, and once it gets to d4 it's as good as over.

CHESSMASTER 3000




Level 3: Queens and Rooks
Next
Move
Cancel
Even if Black moves first and queens first, White queens with check, "skewering" the King and Queen. 1. ... h5 2. a4 h4 3. a5 h3 4. a6 h2 5. a7 h1(Q) 6. a8(Q)+ and 7. Qxh1.

GRANDMASTER CHESS
VS. SARGON V
PC Entertainment Test, 1992

1. d4 f5 2. c4 Nf6 3. Nf3 c5?! 4. dxc5?! Qa5+ 5. Nc3 e6 6. Bf4 Bxc5 7. e3 Ne4! 8. Be5 Nc6!? 9. Bxg7 Rg8 10. Bh6 Nxc3 11. bxc3 Qxc3+ 12. Nd2 Nb4 13. Rc1 Qf6 14. Qh5+ Qg6 15. Qh4 Nxa2 16. Rc2 Nb4 17. Rb2 Be7 18. Qg3 Qf7 19. Qf3 Qf6 20. Qh5+ Rg6 21. Rb1 Nc2+ 22. Ke2 b6 23. Bf4 Na3 24. Rc1 Bb7 25. Qxh7 Bxg2 26. Bxg2 Rxg2 27. Bg3 Rc8 28. Kf1 Rxg3 29. hxg3 d5 30. Rh6! Qf7 31. Qh8+ Kd7 32. Nf3! Bd6 33. Qa1 Rxc4 34. Ng5 Qg8 35. Nxe6 Qg4 36. Nd4 Rxc1+ 37. Qxc1 Nc4 38. Rh7+ Be7 39. Qc2 Ke8 40. Qa4+ Kf8 41. Qxa7 Nd6 42. Qxe7+ Kg8 43. Ne6 Qc4+ 44. Kg2 Qe4+ 45. Kh2 Qe5 46. Rg7+ Kh8 47. Qf8+ 1-0

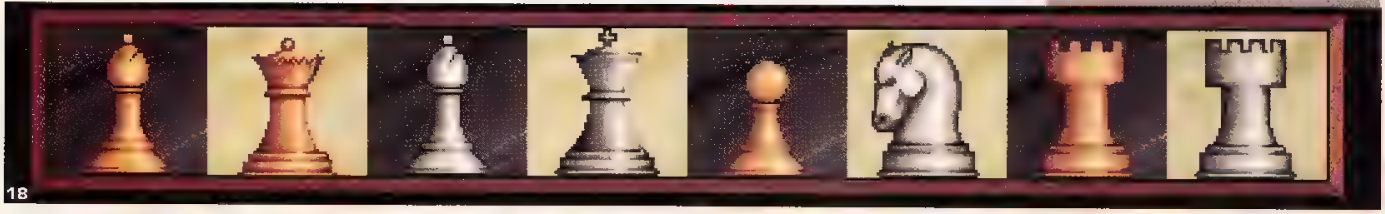
In this game, *Grandmaster Chess* plays a novelty on move eight in an old opening, presumably known by its handlers to goad *Chessmaster 3000* into a premature attack. Off-balance, White gets caught with its king in the center, leading to a nicely executed finish. An interesting game that's both satisfying and credible.

CHESSMASTER 3000
VS. GRANDMASTER CHESS
PC Entertainment Test, 1992

1. e4 e5 2. Nc3 Nf6 3. f4 d5 4. fxe5 Nxe4 5. Nf3 Be7 6. Qe2 Nxc3 7. dxc3 0-0 8. Bf4 Bg4 9. Qe3? Nd7! 10. h3 Bc5! 11. Qd3 Be6 12. Ng5 g6 13. Be2? Nxe5 14. Qg3 Nc4 15. Bxc4 dxc4 16. Bxc7 Qd5 17. Rd1 Qc6 18. Bd6 Rfe8 19. Bxc5 Qxc5 20. Nxe6 Rxe6+ 21. Kd2 Qa5 22. a3 Qb5 23. Rde1 Rd8+ 24. Kc1 Rb6 25. b3 cxb3 26. Qh4 Qd5 27. Qd4 Qg5+ 28. Qe3 b2+ 29. Kb1 Rd1+! 30. Rxd1 Qxe3 31. Rd8+ Kg7 32. Rd7 Qf2 33. g3 Qc5 34. Rf1 Kh6 35. c4 Qxa3 36. c3 Qa1+ 37. Kc2 Qxf1 38. Rd1 Qe2+ 39. Kb1 Qxd1+ 40. Ka2 Qa1+

Elliott Winslow *is currently Assistant Editor of Chess Life, a national chess monthly published by the United States Chess Federation. He has been involved in the chess world in almost every way imaginable, playing postal and over-the-board chess (he earned Master title in 1972 and the International Master title in 1986), directing tournaments, and teaching privately and in public schools. He has also acted as second, coach, and theoretical analyst, written for chess books and magazines, and has done chess-specific work for Saitek, a dedicated chess computer company.*

GP



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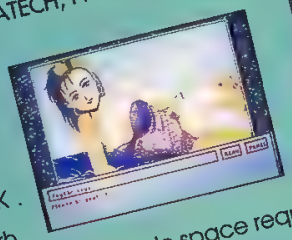
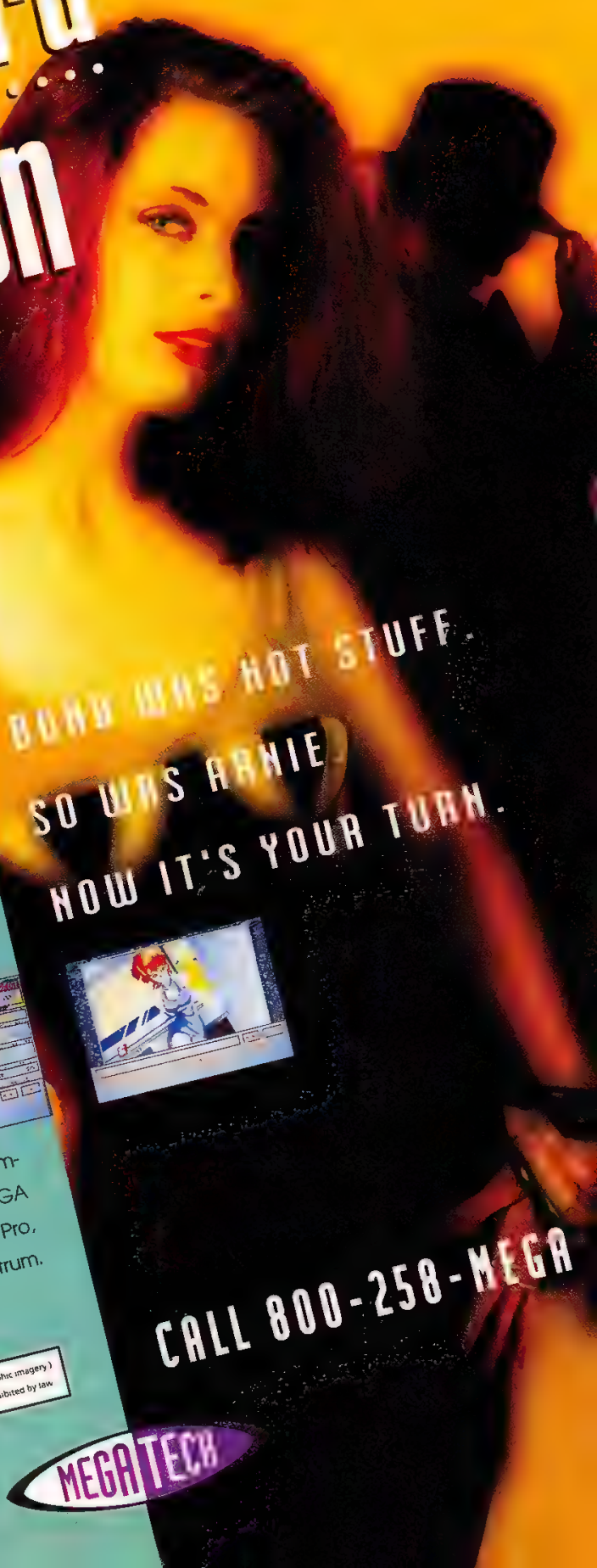


System requirements: 286 or faster machine with 640K RAM hard disk with min.11 megabytes of available space required, mouse recommended. Graphics compatible with EGA, MCGA and VGA (VGA highly recommended). **Sound support:** Sound Blaster Pro, Adlib Gold, Pro Audio Spectrum.

R RATED R (This program is voluntarily rated due to the partially violent and adult nature of the graphic imagery.) This program is intended for mature audiences only!!! No sales to minor under 18 and where prohibited by law.



What's fueling the current explosion in sound boards? For one thing, computer entertainment publishers are increasing the use of sound and music as important game components. Another important element is the support for sound and MIDI in Windows 3.1, the first PC operating system to acknowledge the importance of audio in the world of personal computing. But the single most important factor is undoubtedly the excitement over the promise of multimedia. While no two experts seem to agree on exactly what multimedia is, everyone does agree that it's going to be big.

Industry analysts are forecasting rapid growth in the sales of sound cards over the next few years, and these predictions might have a little something to do with all the great cards now arriving in the market. While electronic musical instruments have always offered much better audio quality than PC sound cards — and at much higher prices — the possibility of big-volume sales in the PC world is encouraging instrument makers and other electronics manufacturers to translate their technology into PC cards.

In this buyer's guide, we'll take a look at the current crop of sound cards on the market. Note that a few of the boards covered here weren't available at press time, but we expect them to be available by the time you read this.

One important product (not formally announced by press time) we did not include in the guide is the Windows Sound System from Microsoft. While not all details are available, we do know that the board includes audio sampling and playback as well as synthesized music capabilities, at a price under $300. It isn't expected to have the joystick or MIDI ports offered by most of the boards in this guide.

A sound card from the creators of Windows and the MS-DOS operating system is a very important event. When the software giant introduced its Microsoft mouse several years ago, it legitimized the mouse as a PC input device, encouraging hundreds of developers to support mice in their programs. Most tried-and-true gamers would say that sound cards are quite legitimate already, but the Windows Sound System could represent to many the final stamp of credibility for the PC sound market.

For reference purposes, the boards in this guide are divided into several categories, with the first group containing entry-level boards. Almost all of these are compatible with the Ad Lib Music Synthesizer Card, the *de facto* standard for game soundtracks, and almost all have retail prices under $200. Notably missing is the Ad Lib card itself, since Ad Lib went out of business last spring. Although some Ad Lib cards might still be on dealers' shelves, they are no longer in production.

The second category includes enhanced sound boards, such as the popular Sound Blaster Pro and the Pro Audio Spectrum. Prices in this group are roughly between $200 and $300.

High-end boards are found in our third group. Sound cards in this class offer either true CD-quality sampling and playback, professional instrument-level music synthesis, or both. Their prices start at $300.

We've also included a small section that covers two sound adapters designed to attach to the parallel ports of laptop computers, which lack slots to hold sound cards.

ENTRY-LEVEL SOUND BOARDS

Stereo F/X
$149.00
ATI Technologies

With the Stereo F/X board, ATI has improved the quality of the Sound Blaster, while maintaining full compatibility and matching the price.

The Stereo F/X is a Sound Blaster compatible board that features sampling — up to 44.1 kHz for mono sampling and 22.05 kHz for stereo — and playback capability. It includes an 8-watt audio amp and enhanced joystick port which reduces some problems with the joystick on very fast PCs.

ATI is an established company, known best for its PC video cards. ATI has managed to improve a bit on the quality of the Sound Blaster while re

TIM VICTOR

We've seen more activity in the sound board market this year than in all previous years combined. As product quality increases, so does technological complexity — and the demands on the PC consumer. We've bundled together several articles in this issue to provide you with a full picture of the multifaceted PC sound market. In addition to this buyer's guide, we urge you to read "Anatomy of a Sound Board," "MIDI 101," and "Multimedia Upgrade Kits."

SOUND BOARDS

A BUYER'S GUIDE

taining full compatibility and matching its price. The Stereo F/X also distinguishes itself by having no jumpers on the board at all; all of its features are software-selectable, which makes for very easy setup.

Like many sound boards, the Stereo F/X's MIDI port uses a couple of free pins on the joystick connector and requires an optional adapter. Priced at $59, ATI's MIDI connector box includes Voyetra's popular *Sequencer Plus Jr.* software.

Media Music 1.0
$79.00
Media Music 2.0
$99.00
Sound Commander 1.5
$109.00
Sound Commander 2.0
$129.00
Sound Commander fx
$139.00
Sound Commander M
$179.00
MediaSonic

Media Music is an Ad Lib compatible sound board, which is to say it has 11-voice, 2-op FM synthesis. Version 2.0 of the package includes additional software, including an FM song player, FM Hook for Windows (which attaches sound effects to various Windows events), and Karaoke software.

Sound Commander adds a digital-voice channel to Media Music 2.0, compatible with Covox's Speech Thing, but does not include digital audio input. Version 2.0 adds Monologue, a speech-synthesis program.

Sound Commander fx is an enhanced Sound Blaster compatible board, and includes 8-bit stereo sampling and playback at up to 44.1 kHz. Also included are MIDI connectors, speakers, and Karaoke software. For an extra $29, you can add an infrared remote control receiver.

Sound Commander M is an MPC-compatible sound board, with all the features of the Sound Commander fx plus the 6-way analog mixer required by the MPC standard.

Sound Master II
$229.95
Voice Master Key
$149.95
Speech Thing
$99.95
Covox

The Sound Master II card combines Ad Lib-compatible FM synthesis with 8-bit sample recording and playback. It supports up to 25 KHz when recording and 44.1 kHz for playback. Included in the Sound Master II package is PC-Lyra composition software for FM & MIDI music, Voice Master Key voice-recognition software. The package also provides Sound Blaster compatibility (with SMulator, a TSR utility) as well as MPU-401 MIDI-port emulation for 386-and-better systems. On the hardware side, it includes stereo speakers, a microphone, and MIDI adapter cables.

The Voice Master Key card offers both sampling and playback of digital audio. It comes with voice-recognition software, which permits hands-off operation of many PC programs. It does not include any music synthesis features.

Speech Thing is an output-only device for playing digitized audio. It attaches to the PC's printer port. Included with the Speech Thing package is the SmoothTalker text-to-speech program, as well as a set of programming tools.

Sound Blaster
$149.95
Creative Labs

With the departure of Ad Lib from the sound card market, the Sound Blaster is the unchallenged standard for entry-level PC sound cards. Other boards may offer improved features, but there's a good chance they'll spend most of their lives imitating a Sound Blaster, limitations and all.

The Sound Blaster features 11-voice, 2-operator FM music synthesis via Yamaha's YM3812 chip (Ad Lib-compatible), and an 8-bit digital audio channel, recording at rates from 5-12 kHz and playing back samples between 4 and 23 kHz. These are fairly low rates compared to most other boards in this guide. The fact that Creative Labs refers to it as a "digitized voice channel" suggests that it wasn't designed for high-fidelity musical uses. It's mostly for speech and sound effects in games, and in that capacity, it's at least adequate.

The Sound Blaster also includes a standard PC joystick port and a MIDI port, although a cable kit, sold separately, is required if you want a MIDI connection. It doesn't include drivers for Windows 3.1 — but it doesn't have to, since Sound Blaster drivers are included in version 3.1. That's a pretty good indication of how popular this board is.

ThunderBoard
$169.00
ThunderBoard for Windows
$179.00
Media Vision

Media Vision's entry-level sound board is compatible with Ad Lib and Sound Blaster boards. Bundled with its own set of software, the ThunderBoard can sample digital audio at a higher rate than the Sound Blaster — from 4 to 22 kHz.

ThunderBoard for Windows is the same board packaged with several Windows audio applications. These include Sound Forge, a waveform editor; Monologue for Windows; and Lotus Sound, an audio recorder that uses Windows' Object Linking Environment.

ENHANCED SOUND BOARDS

UltraSound
$199.95
Advanced Gravis

This is the first sound card from the joystick magnates at Advanced Gravis, and it holds a lot of promise. Although we haven't had any hands-on time with one (it was supposed to be shipping as we were going to press), we have heard demos and had a look at the specs. If the UltraSound lives up to its billing, it'll be quite a product, especially considering the price.

The specs show 32-voices of 16-bit synthesis and 8-bit stereo sampling at 44.1 kHz, along with Ad Lib and Sound Blaster compatibility. It includes a speed-compensating dual joystick port, along with a MIDI port and connectors, and an optional SCSI CD-ROM interface.

Sound Blaster Pro
$299.95
Sound Blaster Pro Basic
$229.95
Creative Labs

The Sound Blaster Pro is Creative Labs' standard MPC board, featuring stereo sample

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recording and playback, improved music synthesis, an analog audio mixer, and a CD-ROM interface. The same board also appears as part of their complete MPC upgrade kit (see "Multimedia Upgrade Kits," elsewhere in this issue). It's ful–ly compatible with the Ad Lib and the original Sound Blaster.

Current versions of the Sound Blaster Pro feature Yamaha's 20-voice, 4-operator stereo FM synthesis chip, the YM262. This one chip replaces two Ad Lib-style 2-operator chips, the arrangement found on early Sound Blaster Pro boards. The board is capable of 8-bit stereo sampling at rates from 4 to 22.05 kHz, and mono recording at 44.1kHz.

MIDI cables are included, along with the *SP Pro Sequencer* from Voyetra, a version of *Sequencer Plus Jr.* The on-board CD-ROM interface works only with the Matsushita CR-521 CD-ROM drive, which is included in Creative Labs' Multimedia Upgrade Kit.

The Sound Blaster Pro Basic is the same package minus the MIDI adapter kit.

BSR MediaMaster

$199.90

DAK Industries

Here's another product we're still looking forward to seeing, but which should be available by the time you read this. According to the specs, the MediaMaster is an MPC-compatible sound board with sample-playback synthesis and 16-bit stereo sample recording and playback, all at the standard sampling rate of 44.1 kHz. Its 128 preset instrument sounds are compatible with Roland's GS standard, which is itself compatible with General MIDI (for details, see "MIDI 101" elsewhere in this issue.)

Also included are *Monologue for Windows* text-to-speech software, *MidiSoft Recording Session* music composition software, and a Windows version of the award-winning *Band-in-a-Box*. Ad Lib and Sound Blaster compatibility (i.e., FM synthesis) is available via an add-on board, a $49.90 option.

Note that the $199.90 price is the street price for the MediaMaster, while all the other prices listed in this guide are at suggested retail. Even so, the price seems reasonable for a board of this caliber. DAK has an excellent reputation for customer service and offers a no-questions-asked refund within 30 days of purchase.

Curiously, the MediaMaster does *not* include a CD-ROM interface, surprising since DAK is one of the world's leading suppliers of CD-ROM drives and software.

Sound Commander Gold

$239.00

MediaSonic

An MPC-compatible sound card with Yamaha's YM262 chip, the Sound Commander Gold offers 4-operator FM synthesis with 20 stereo voices. Otherwise, it's similar to MediaSonic's Sound Commander M card, found in the previous category.

Pro AudioSpectrum Plus

$199.00

Media Vision

An MPC-compatible card, the Pro AudioSpectrum Plus features 4-operator FM synthesis and 8-bit stereo sampling. Unlike its closest competitor, the Sound Blaster Pro, this board can sample in stereo at the maximum sample rate of 44.1 kHz.

Although the connector box for its MIDI ports is an extra-cost option, the basic package includes Voyetra's *SP Spectrum* sequencer. Even without MIDI connections, *SP Spectrum* can play sequences through the Pro Audio–Spectrum Plus's FM synthesizer.

There are two varieties available, a SCSI bus model and one that supports the Sony bus — either of these types are more common than the proprietary Matsushita interface that's built into Sound Blaster Pro boards.

AudioMaster

$299.00

OmniLabs

The AudioMaster is another interesting sound board that wasn't available at press time, but should be available now. An MPC-compatible board with 24 voices of sample-playing synthesis, it's based on the circuitry used in the Ensoniq EPS music synthesizer. It features 12-bit sampling and 16-bit sample playback.

Ad Lib and Sound Blaster compatibility is an extra-cost option, with the snap-on module priced at $69.95. Software includes Voyetra's *Sequencer Plus Jr.*, *Monologue*, and *Band-in-a-Box*.

Several CD-ROM interface options are offered, including SCSI, Sony bus, Philips, and Matsushita.

HIGH-END BOARDS

Sound Blaster 16

$349.95

Creative Labs

With this bigger brother of the Sound Blaster Pro, Creative Labs enters the major leagues with true CD-quality sample recording and playback. Besides professional-quality 16-bit A/D and D/A converters, the Sound Blaster 16 also features a new MPU-401 mode for its MIDI port, making it compatible with more music software.

Pro AudioSpectrum 16

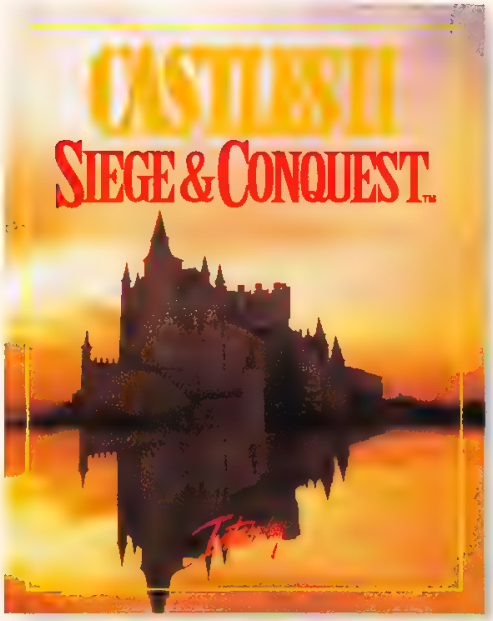
$299.00

Media Vision

Add 12-bit and 16-bit sampling, as well as playback, to the Pro AudioSpectrum Plus and this is what you get. Other than that, these two boards appear to be identical.

Take Media Vision's MPC-compatible Pro Audio Spectrum Plus, add 12- and 16-bit sampling, as well as playback, and you get the impressive Pro Audio Spectrum 16.

Do You Have What It Takes To Win The Crown?



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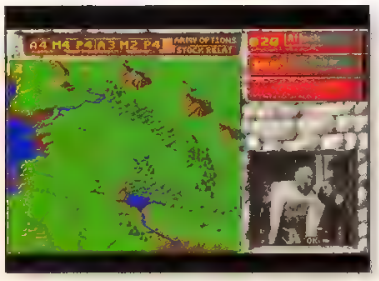

MS-DOS Screens Pictured.

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SCC-1
$499.00
Roland

From Roland, a top name in professional keyboard instruments, comes this General MIDI sound board, which is also compatible with Roland's earlier GS board. The SCC-1 promises an even higher level of sound quality than the well-respected LAPC-1.

Equivalent to the popular Sound Canvas MIDI sound module, the SCC-1 features 317 sampled instrument sounds, with 24-voice polyphony and 16-tone multitimbral capability. It can also emulate the preset sounds of Roland's older LAPC-1 card as well as the MT-32 and CM-32L MIDI sound modules.

The SCC-1's MIDI interface is MPU-401 compatible, so it should work with just about any PC music software. MIDI adapter cables are included. The SCC-1 has no sampling or speech capabilities.

LAPC-1
$595.00
Roland

More expensive but less powerful than the newer SCC-1, Roland is still offering the LAPC-1 while software support builds for the SCC-1. Although the SCC-1 can emulate the LAPC-1's preset sounds, this level of compatibility isn't complete enough for some of Roland's customers. The LAPC-1 was the first pro-quality sound option for the PC, and it has enjoyed a measure of success, especially considering its price bracket.

Since it's compatible with Roland's classic MT-32 MIDI sound module, the LAPC-1 enjoys the support of a fair number of PC games, and it produces a much higher level of sound quality than the Ad Lib and Sound Blaster standards can deliver. But given the price of that quality, most of the demand for this card comes from the music community rather than the game community.

Like the SCC-1, the LAPC-1 includes an MPU-401 compatible MIDI interface, but has no sampling or speech capabilities.

MultiSound
$995.00
Turtle Beach

This is the reigning king of cool sound boards. It combines the workings of E-mu's Proteus 1/XR MIDI sound module with Motorola's hot 56001 digital signal processing chip, and adds in CD-quality 16-bit stereo 44.1 KHz sampling and playback. To top it all off, it includes pro-quality input and output circuitry, with 64-times oversampled A/D converters, 8-times oversampled interpolating filters, and sigma/delta D/A converters.

MultiSound from Turtle Beach is the creme-de-la-creme of sound boards. It features a built-in Proteus synthesizer with four megabytes of 16-bit samples and 383 preset sounds.

The built-in Proteus synthesizer features four megabytes of 16-bit samples, 383 preset sounds, and another 128-program bank of General MIDI-compatible presets. It is 32-voice polyphonic and includes a full MIDI interface, though it needs an optional adapter for its non-standard MIDI connector.

MultiSound is fully MPC-compatible, and most of the bundled software runs under Windows. Included with the board is Wave Lite, a limited version of Turtle Beach's Wave for Windows sound-editing software.

You'll need Windows 3.1, or 3.0 with the Multimedia Extensions, a 386 computer, 2MB RAM, 40MB hard drive and a free 16-bit slot to install MultiSound. Turtle Beach recommends at least a 25-MHz 386 for full-bandwidth sampling.

We've seen the MultiSound discounted to prices under $750, but, for many people, this is a lot of money to lay out for a sound card. The MultiSound isn't Ad Lib or Sound Blaster compatible either, but if you can afford it, you can afford either or both of these lower-end boards, too.

THE LAPTOP CONNECTION

Port Blaster
$199.95
Creative Labs

The Port Blaster is Creative Labs' entry in the parallel-port sound sweepstakes for laptops and oddball unexpandable PCs. Its features are equivalent to the Sound Blaster Pro, with 4-operator, 20-voice stereo FM synthesis, 8-bit stereo sampling and playback, and a MIDI interface. It includes a built-in speaker for plug-and-play operation.

Audio Port
$199.00
Media Vision

Media Vision offers the Audio Port for attaching to parallel ports — its specs are roughly equivalent to the entry-level Thunder Board (see above). It's a mono device, recording and playing back samples at up to 22 kHz, and features 2-operator FM synthesis.

SOUND BOARD RESOURCES

Advanced Gravis
#111, 7400 MacPherson Ave.
Burnaby, British Columbia
Canada V5J 5B6
(604) 434-7274

ATI Technologies
3761 Victoria Park Ave.
Scarborough, Ontario
Canada M1W 3S2
(416) 756-0718

Covox
675 Conger Street
Eugene, OR 97402
(503) 342-1271

Creative Labs
1901 McCarthy Blvd.
Milpitas, CA 95035
(408) 428-6600
(800) 998-LABS

DAK Industries
8200 Remmet Ave.
Canoga Park, CA 91304
(818) 888-8220

MediaSonic
46726 Fremont Blvd.
Fremont, CA 94538
(510) 770-8600

Media Vision
3185 Laurelview Court
Fremont, CA 94538
(510) 770-8600
(800) 845-5870

OmniLabs
13177 Ramona Blvd., Suite F
Irwindale, CA 91706
(818) 813-2630

Roland Corporation
7200 Dominion Circle
Los Angeles, CA 90040-3647
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Turtle Beach
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(717) 843-6916

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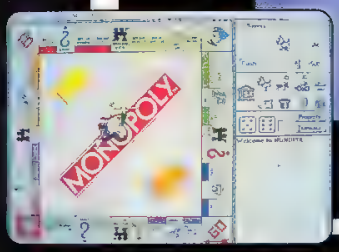

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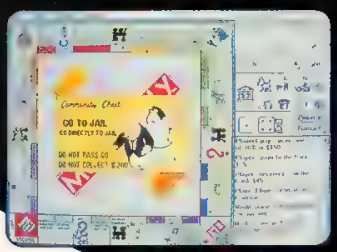

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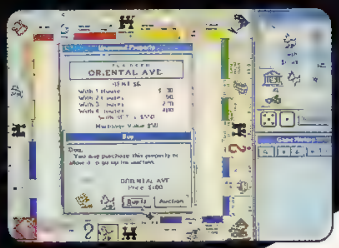

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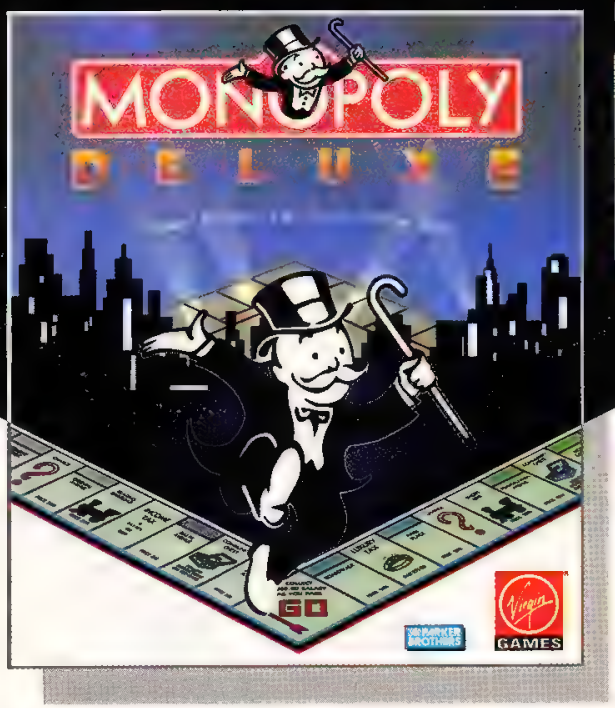

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TIM VICTOR

FM Synthesis. Bit Depth. Sample Rate. Signal-to-Noise Ratio. If you think soundboard specs are for audiophiles only, read on — here's the straight scoop on the tech talk.

Music, sound effects, and speech make computer games more exciting and more fun to play. But PC audio has become more than just an entertaining soundtrack; it's now an integral part of many recent games. To date, only a few games actually require a sound board, but most are written to take advantage of one or more of the popular cards. Knowing what's in a sound board and what the differences are between the different boards currently available can help you find the right one for your needs.

Most PC sound boards perform several functions. They may contain one or more of the following: music synthesis, D/A (digital to analog) converters for playing sampled effects and speech, A/D (analog to digital) converters for sampling and/or voice-control, MIDI ports, and a CD-ROM interface. There are varying degrees of implementation for each of these. Which features you need depends on what you intend to do with your computer and, of course, on your budget.

For most applications, music synthesis is the most important function of the card. The term *synthesis* refers to the technology of simulating the sounds of various musical instruments.

Although synthesizers have used many different *algorithms* (methods of operation), for creating sounds, only two techniques are currently used in PC sound cards — *FM synthesis* and *sample-playback*.

FM SYNTHESIS

"FM" has the same literal meaning — *frequency modulation* — in synthesis as it does in radio, but in practical terms, FM synthesis and FM radio really don't have much in common.

The idea of using frequency modulation to synthesize instrument sounds was developed by computer music researchers at Stanford University in the mid-1970s. Although they knew that FM synthesis could produce a wide range of complex musical tones, their computers couldn't perform the necessary mathematical operations fast enough to create music.

FM synthesis was pretty much a theoretical curiosity until it captured the interest of engineers at Yamaha, the electronics, industrial, and musical-instrument giant. Yamaha had the know-how to create a single electronic chip that could perform all of the computations needed for FM synthesis, and to make it inexpensive enough to use in moderately-priced musical instruments.

FM sounds are created by combining several oscillators, or *operators*. By itself, an operator produces a sine wave, a pure, simple tone which sounds a lot like what you hear from a tuning fork. A simple FM sound combines two operators, called the *carrier* and the *modulator*. The carrier's output is actually heard in the output of the sound board, while the modulator is used to vary, or modulate, the frequency of the carrier.

If the carrier's frequency were to change five or ten times a second, it would yield a pleasant waver in pitch, known as *vibrato*. However, an FM modulator's frequency is normally at least as high as the carrier's, a rate of several hundred cycles per second. Instead of causing vibrato, it distorts the shape of the carrier's sine wave output, fundamentally changing its tone.

Having more than two operators to work with increases the range and quality of tones available. A modulator can itself be modulated by a third operator, or the chip can add the outputs of two operators at different frequencies and use their sum to modulate the carrier.

While Yamaha's professional-level DX-7 synthesizer featured 6 operators per voice, no PC sound card has had more than 4 operators available for each voice. The first generation of sound cards, the Ad Lib and compatibles (including the Sound Blaster), used Yamaha's YM3812 chip, offering 11 2-operator voices. It can produce a wide variety of sounds, but it can't truly duplicate the sounds of real-world instruments.

The latest versions of the Sound Blaster Pro and the Pro AudioSpectrum cards use Yamaha's newer YM262 chip, alternately called OPL-3. It has 20 voices and stereo outputs, and can combine up to 4 operators per voice, while still being able to emulate the 2-operator chip for full Ad Lib compatibility.

Every synthesis technology has strengths and weaknesses, and so it is with FM. It's particularly good for creating bright sounds, especially metallic tones like bells and chimes, but it also has a well-deserved reputation for not being able to make warm, smooth string sounds. If someone promoting a sample-playback sound card compares its "string ensemble" sound to an FM synthesizer, you'll know what angle he's playing.

There's no doubt that FM synthesis is being eclipsed by sample-playback technology. No longer state-of-the-art technology, FM synthesis is still very useful for sound effects in games and some musical applications. It's the only option at the low end of the price range, and it's also essential for compatibility with the Ad Lib sound board. And that alone is enough to insure that FM synthesis will be around in sound boards for quite a while.

For most applications, music synthesis is the most important function of any sound card.

SAMPLE-PLAYBACK SYNTHESIS

The basic principle here is simple enough: if you want your music to sound like, say, a piano, record a note on a piano, then play back that recording for each note. For high-quality synthesis, though, it's a lot trickier than that.

A sample of an instrument playing a note has a certain pitch and lasts a certain length of time. While it isn't hard to change the pitch of a sample, there's a catch: the tone of real-world instru-

ANATOMY OF A SOUND BOARD

ments varies tremendously as different notes are played —a saxophone produces very different waveforms at different pitches, behaving almost like different instruments in different registers, and pianos may be even worse in this respect, especially since they can play such a wide range of pitches.

A recorded note also has another property — *dynamics* — which can easily be understood when you consider how hard a piano key is pressed, how much air a trumpeter uses when blowing, or how a guitarist picks the string. Dynamics affect both the volume and the tone of the note.

This means that when a synthesizer plays a sample, it has to alter the pitch, sustain, and dynamics of each note. It might vary the tone by filtering the sample (through use of a time-varying amplifier to modulate its volume), or by blending a couple of different samples. The synthesizer will also probably have to repeat some part of the sample over and over, a process called *looping*, in order to keep it playing for as long as the note is sustained.

Most sample-players use more than one of these techniques plus several others. Regardless, though, it's clear that a sound will rarely — if ever — play back exactly as it is stored in sample memory. What matters is how well the synthesizer mixes and modifies its samples to reproduce the entire range of an instrument.

Starting with a large ROM full of well-recorded samples obviously helps here, but there's more to it than that. Unfortunately, while you can find out how many megabytes of sample ROM a board has, there are no numbers or specs that indicate how well it uses those samples.

Compatibility is another issue to consider when looking at specs for a new sound card. While practically every game on the market includes full support for FM synthesis, sample playback synthesizers are relying on the acceptance of two standards —Multimedia PC and General MIDI — for their software support. This support will come in time, but right now there aren't that many programs that will work with all these boards.

High-end boards that claim Ad Lib or Sound Blaster compatibility must also include circuitry for FM synthesis, since most games operate the Yamaha FM chips directly. Some manufacturers sell this feature as a $60 or $70 add-on option. Remember that, even with this option, your high-end sound board won't sound any better than a 2-operator FM Ad Lib board as long as it's emulating one.

DIGITIZED AUDIO CHANNELS

Most PC sound cards are able to digitally record and play back any sound using one or two channels of digitized audio — somewhat like a tape recorder, except that the recorded sound is stored in computer memory as a series of numbers.

An audio signal is recorded by digitizing (or *sampling*) it, with a microphone or some other sound source connected to the card. A component called an *analog-to-digital (A/D) converter* measures the voltage of the input signal thousands of times a second, and outputs a number, or sample, represent-

The levels of hiss and hum in a sound board can be measured, but few manufacturers include this in their specs.

ing the signal at that point in time. In the case of stereo sampling, two input voltages are measured, and a sample is generated for each input channel. To play the sound back, the process is reversed, with a *digital-to-analog (D/A) converter* producing the output voltage which eventually goes to your speakers.

The two most important criteria here are the *sample rate* and *bit depth* of the samples. The sample rate is simply the number of times per second that the A/D converter outputs a sample, rated in *kilohertz* (kHz), or thousands of samples per second. Raising the sampling rate improves the quality of a sample by increasing its frequency range. To faithfully record a signal, the sampling rate must actually be twice the highest frequency in the signal. This top-end number is referred to as the *Nyquist limit*.

Speech is recognizable even at very low sampling rates, but in listening to music, most people can hear signals as high as 20kHz. (Music is recorded on CDs at a rate of 44.1kHz, which is also the highest sample rate of current PC sound boards).

Digitized audio was originally added to PC sound cards to allow for speech and some sound effects. Cards like the Sound Blaster can't sample at the rate needed for high-quality music reproduction, but then they weren't designed for that. Newer cards, like the Sound Blaster Pro, Pro AudioSpectrum, and especially Turtle Beach's premium MultiSound card were.

Bit depth has received a lot of attention from sound card makers lately. The A/D converters in most sound cards can produce an eight-bit (one byte) output for each sample. While the sample rate determines the frequency response of the sample, bit depth determines how accurately the sample tracks the input signal. If a variation in the input is too small to change the lowest-order bit of the output, it is lost.

In theory, an 8-bit D/A converter can play back a sampled sound with a 48 dB *signal-to-noise ratio*. This is about as good as an average cassette tape recording. By comparison, a 16-bit sample played through a 16-bit D/A converter can theoretically achieve a 96 dB signal/noise ratio, the same level as used in audio CD's.

Remember that the signal-to-noise ratio of an 8-bit sample can never be any better than 48 dB, even if you play it through a 16-bit D/A converter. The distortion already there in the sampled signal can't be removed by a D/A converter—it can only try to keep from adding any more.

The inside of a PC's casing is a hostile environment for audio equipment, with very high levels of radio-frequency energy. While digital circuits can tolerate this RF noise, the sound card's job is to translate the digital data into analog audio signals for you to listen to. Noise in the board's output is often a serious troublespot.

Designers of higher-end sound boards go to great lengths to shield the audio circuits from noise. The levels of hiss and hum in a sound board's outputs can be measured just as distortion can, but not many board makers include this in their specs. For some manufacturers, it might be a matter of not wanting to break the bad news, but there's more to it than that. Different models of PCs have different levels of internal RF, and there are no standard conditions under which to take the measurements.

The bottom-line recommendation, naturally, is to listen carefully before you buy. Listen through the best speakers you can, and try to bring along some sample files that you know are well-recorded. Try turning up the volume knob when the board isn't playing anything; you should be able to turn it up fairly high before you can hear any noise coming out of the speakers.

THE MIDI INTERFACE

MIDI (Musical Instrument Digital Interface) is the universally accepted standard for connecting electronic musical instruments to computers and to each other. With MIDI, you can enter notes into a music composition program by playing them on a piano-style keyboard. You can also use MIDI when playing back songs, using a synthesizer's tone voices instead of the sound card's, or even use both sound sources at the same time. For more details, see the following article, "MIDI 101."

The original Ad Lib sound cards didn't include MIDI interface circuitry, but just about every other PC sound card since then does. Many don't include the standard 5-pin MIDI connectors, selling them instead as part of a MIDI accessory kit. Leaving the connectors off of the main board is mostly a cost-cutting measure, as they are probably the most expensive part of a MIDI interface; and their omission also saves valuable space on backs of sound cards, which are already crammed full of jacks and connectors.

THE CD-ROM PORT

Most of the sound boards released in the past year are designed as part of a Multimedia PC (MPC) system. (See "Multimedia Upgrade Kits" elsewhere in the issue.) Since the MPC standard also calls for a CD-ROM drive, many sound boards include the circuitry needed to connect one.

CD-ROM interfaces are anything but standardized. There are at least three different types built into PC sound boards. The Sound Blaster Pro features an interface for certain Matsushita drives, while Pro AudioSpectrum boards are available with either a Sony bus or a SCSI interface. There are several different brands of SCSI-based CD-ROM's available, including NEC, Hitachi, and Toshiba products.

If you're considering getting a drive with any of these interface types, be sure to check its model number against the sound-board manufacturer's list of certified drives. Some interface standards, particularly SCSI, are less standard than they should be. The manufacturer can tell you which models they've tested and found to be compatible.

In fact, unless you're an adventurous type, the safest approach is to get a complete CD-ROM upgrade kit from the sound board's manufacturer. If you prefer to do it yourself, get a cable kit, since the CD-ROM drive probably won't come with cables.

LET YOUR EARS DO THE WORK

The PC sound board market is exploding right now. Sparked by excitement about the evolving world of multimedia, and fueled by technology from the music industry, the cards introduced in the past year blow away everything done before in almost exponential fashion.

To find the right board, it's essential that you understand certain features and know which specifications are important. But most of all, listen carefully. When you're dealing with sound boards, what you hear is what matters most.

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Does your PC have a sound board? If so, you probably already have a MIDI interface. And if you use your sound board for games only, you've probably asked yourself more than once, "So what is this MIDI thing?" MIDI, an acronym for Musical Instrument Digital Interface, is a very popular and successful standard for communicating musical information between digital devices. The two most common devices it connects are computers and music synthesizers.

For you, the PC user, there are two main reasons to use MIDI: to control a separate music synthesizer, and to use a piano-style keyboard with music programs running on the computer. The best-known application of MIDI on a PC is music composition. Typically, a program called a *sequencer* lets you record, edit, and play back the MIDI data that makes up a song. While it's possible to enter and edit songs on the PC's keyboard, a MIDI piano-style keyboard makes the job much easier and more accurate.

MIDI can also improve the sound and music in entertainment software. Many games can play their music on popular MIDI synthesizers like Roland's D110 and MT-32, Yamaha's FB-01, and the new General MIDI-compatible instruments (more on General MIDI below), with much higher quality than most sound boards can give you.

MIDI has become the native language of PCs for most musical applications. When you edit a song in a sequencer, you usually see note numbers, note velocity, and program numbers directly from the song's MIDI data. Although most sequencers can play songs using a PC sound card, they still use the MIDI language for representing the songs and controlling the sound board.

MIDI has become even more important to the PC world with the arrival of Windows 3.1. The latest Microsoft upgrade includes the Windows Multimedia Extensions, which makes it much easier for programs to include music and sound effects. Under the Multimedia Extensions, the official language for creating synthesized music is — you guessed it — MIDI.

THE KEYBOARD CONNECTION

Because MIDI was designed by synthesizer manufacturers, all the messages and parameters carried by MIDI have something to do with the operations of an electronic keyboard instrument. Even if you don't ever intend to own a keyboard synthesizer, you'll probably find that if you know something about it, you'll understand more about MIDI. Keep in mind that the heart of a PC sound board is basically a synthesizer sans keyboard, so if you have a sound card, you already own a synthesizer whether you know it or not.

Before proceeding, it's important that we understand a critical point: A MIDI cable doesn't carry audio of any sort, digital or otherwise — it only conveys messages about what musical notes to play and how they should sound when played.

The most common MIDI messages represent exactly all the control inputs that a synthesizer might receive: note on, note off, key velocity, pitch bend, aftertouch, and program change. These are the events that you can create and edit in a sequencer program, as well as the messages that a PC uses to communicate with a MIDI instrument.

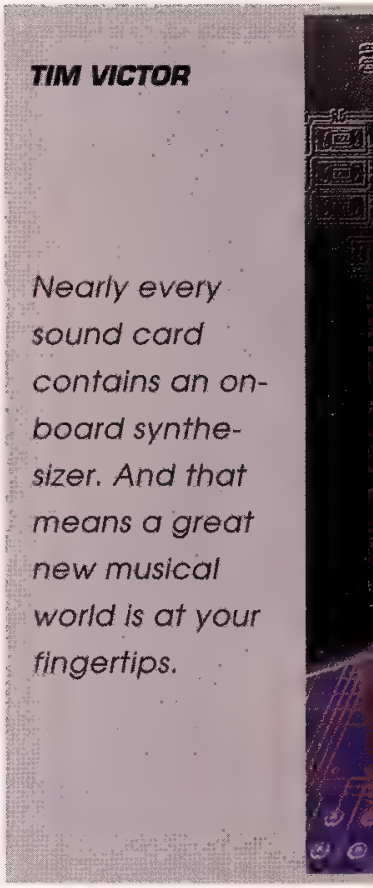
The most important events in a synthesizer performance are the movements of the keys. A key goes down and then comes back up, and the instrument usually plays a note as long as that key stays down. MIDI uses *note-on* and *note-off* messages to represent the up-and-down movements of keys. Each note-on contains a key number between 0 and 127, representing the pitch of the note, with a value of 64 representing middle C. Note-on messages also contain two extra items: a channel number and a velocity value. We'll get back to those in a minute.

If two or more keys are pressed at the same time, you'd expect to hear two or more notes. That's definitely what you'd hear with a piano or an organ, two examples of polyphonic instruments, and also what you'd hear with a polyphonic synthesizer. All contemporary synthesizers are polyphonic, although this wasn't necessarily true even ten years ago when MIDI was designed.

Unlike a piano, a synthesizer has a limit to the number of notes it can play at once. Where a piano has a separate hammer and strings for each key, a synthesizer has a smaller number of tone generators or *voices*, usually between 8 and 32 of them. At any time, each voice can play only one note.

If a note-on event takes place and all the voices are already playing notes, the instrument has to turn off one of those notes first. This is called *voice-stealing*, and all synthesizers do it, typically stealing the voice from the key that's been held down the longest. You can hear this without too much trouble on an 8-voice synthesizer by pressing a lot of keys, one at a time.

MIDI has become even more important to the PC world with the arrival of Windows 3.1.

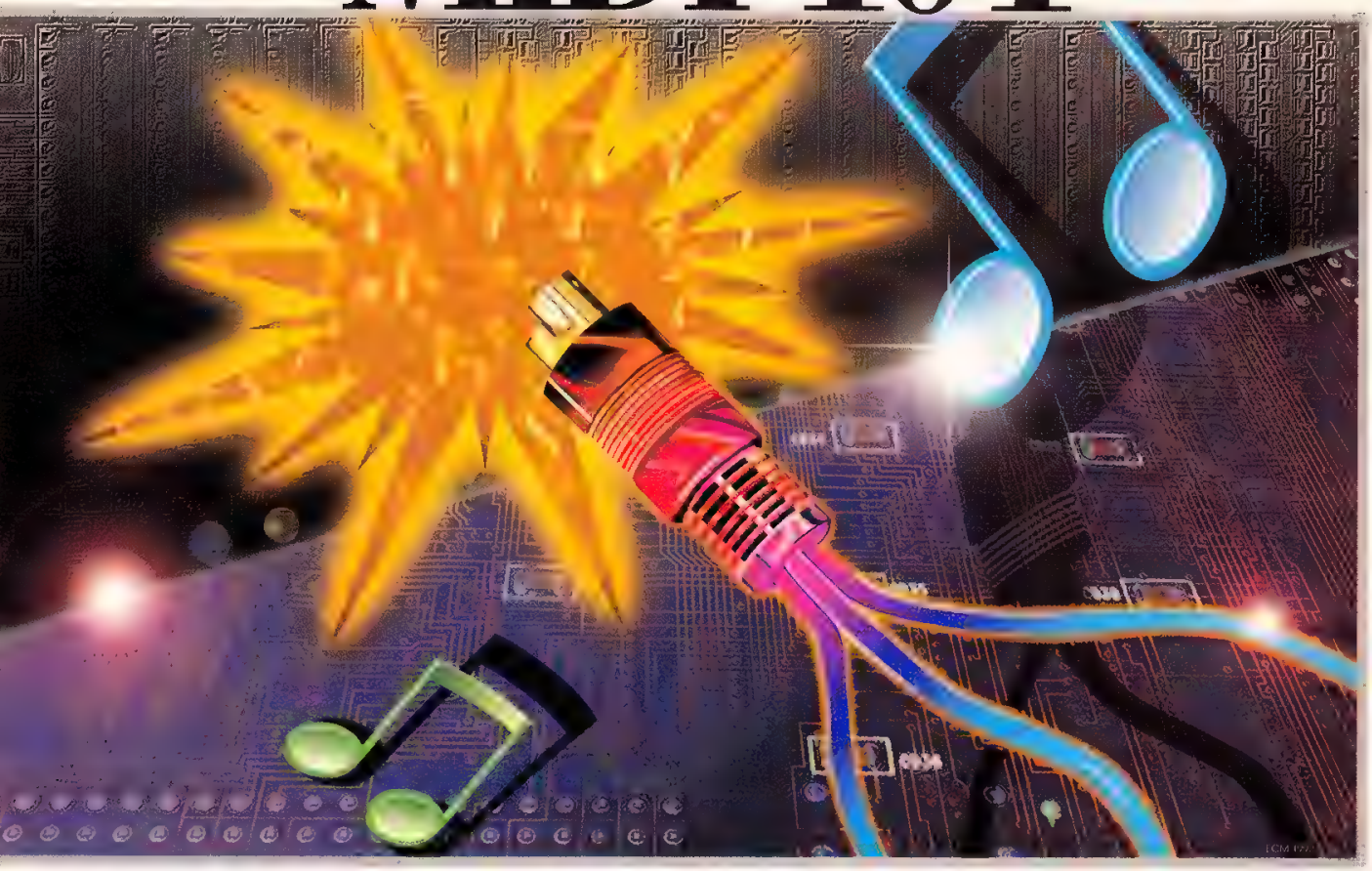

TIM VICTOR
Nearly every sound card contains an on-board synthesizer. And that means a great new musical world is at your fingertips.

EXPRESSION

A musician playing any instrument, whether a piano, a synthesizer, a violin, or a kazoo, does a lot more than just turn notes on and off. Each note played has its own tone and dynamics, and both are every bit as important to the music as the pitch.

Besides reporting which keys are up and down, most synthesizer keyboards are *velocity-sensitive* — that is, they measure how quickly the keys move when they're pressed down. This information is in-

MIDI 101



cluded in a note-on message as a value between 1 and 127. The MIDI standard doesn't label all of these numbers, although a 127 is at the high end (the fastest velocity), and non-velocity-sensitive keyboards always report a velocity of 64. A note-on with a velocity of 0 is a special case: it means note-off.

A synthesizer can be programmed to use this velocity data in different ways, but it usually imitates a piano's response: the harder a key is pressed, the louder and brighter it sounds. Of course, a synthesizer can also be programmed to ignore key velocity completely, in which case it plays like an organ, where each note sounds at the same volume with the same tone no matter how hard or lightly you press the key.

Most synthesizers also have a *pitch-bend* input, usually controlled by a wheel to the left of the keyboard. Guitars, harmonicas, and lots of other instruments can play smoothly changing pitches, called *bent* notes. Since each key of a synthesizer produces a single fixed pitch, it uses the pitch-bend input to bend notes. Rolling the pitch-bend wheel in either direction smoothly raises or lowers the pitch of any note being played.

Some keyboards measure *aftertouch*, which is the amount of force imposed on a key while it's being held down. Like velocity, there's more than one way to use aftertouch, but it often changes the tone of the note being played. A saxophone tone on a synthesizer might imitate overblowing, or a violin tone might simulate finger vibrato.

While MIDI includes specific messages for pitch-bend and aftertouch, it cannot accommodate messages for every possible knob, slider, pedal, and switch on a synthesizer. Instead, MIDI has a single generic *parameter-change* message, accommodating up to 90 controls that don't have specific channel messages. MIDI sequencers record and play back parameter-change messages right along all the rest of the MIDI data.

A MIDI parameter-change message contains two values, a parameter number and a new value for that parameter. The MIDI standard leaves it up to the manufacturers to give each control a parameter number. A list of these numbers, along with their range of values, can be found in the "MIDI Implementation Guide" section of the owner's manual that comes with your keyboard synthesizer.

PROGRAMS AND CHANNELS

Most synthesizers have some way of selecting and changing the current instrument sound. It could be, for example, a row of buttons, a calculator-style keypad, or a rotating knob. In the synthesizer world, instrument sounds are referred to as "programs," and MIDI uses this same name.

The MIDI program-change message chooses an instrument sound. MIDI program numbers run from 1 to 128, but the basic MIDI spec doesn't specifically address what these numbers mean. Sending a "Program-change 1" message to a synthesizer simply selects whatever instrument the synthesizer "thinks" program 1 should be. However, a newer standard called General MIDI actually

defines sounds for all the MIDI program numbers.

Most current synthesizers are *multitimbral* — that is, they can play several different instrument sounds at the same time. To imitate a jazz combo, a multitimbral synthesizer might need to create the sounds of drums, a bass, a piano, and a trumpet. Plenty of synthesizers can do that, including most PC sound cards. In the case of MIDI, there has to be some way of defining which instrument plays which notes. Fortunately, MIDI's 16 different channels provide a solution.

In the world of MIDI jargon, all the events we've covered so far are known as *channel messages*, and each message includes a channel number between 1 and 16. A single channel can carry one of the instrument parts for a multitimbral device, and it can also be used to identify one particular MIDI device when several are hooked up together.

A MIDI channel, like a television channel, carries a separate signal; and a MIDI device can listen exclusively to the data on that one channel (although it doesn't have to). There is one big difference though: while a TV cable or antenna carries dozens of signals simultaneously, a MIDI cable can carry just one signal at a time. MIDI messages for different channels actually come consecutively, not at the same time.

Manufacturers can also define their own system-exclusive (sysex) messages to control features that are hard to describe as a simple control input or a program change. For example, defining a particular trumpet sound with the panel controls on a Yamaha DX-7 synthesizer means selecting and editing several dozen different internal parameters. Yamaha has defined sysex messages to read and write that entire group of parameters in a single block.

The format and contents of a sysex message are designed entirely by the manufacturer, and they should be described in the instrument's MIDI Implementation Guide. Very few entry-level sequencers record or playback sysex messages, since you don't usually need to include them in your compositions.

STANDARD MIDI FILE

In 1988, a MIDI extension — the *Standard MIDI File* (SMF) — was introduced to describe a way to store musical data in a computer file. Today practically all sequencing programs can read and write SMF-format files. On PC's, Standard MIDI files commonly use a .MID suffix.

Some programs use SMF as their native format, while others include an option to import and export them, converting them to and from some other proprietary format. Either way, SMF is usually the easiest (and often the only) way to transfer a sequence between two different programs. Since SMF is supported on all different types of computers, you can easily exchange .MID files with someone who has a Macintosh, an Amiga, or an Atari ST. Some stand-alone MIDI sequencing boxes — such as Roland's SoundBrush — can read Standard MIDI files from PC disks.

Although just about any sequencer can load and play an SMF, you might not be happy with the initial results. SMF can keep the different instrument parts of the song separate (each instrument is usually an individual track in the sequencer), but there's no way to make sure that each track is assigned to the correct instrument. If your system isn't set up the same way as the arranger's, it might play the song's bass part with an accordian sound, or even use a piano sound to play all the drum parts.

Of course, with a little tweaking in the sequencer program, you can usually get the sounds right. The file's author will usually include the names of instruments on the different tracks, either as comments in the file itself or in a separate text file that accompanies the sequence. If your synthesizer can play all the instrument sounds that the SMF calls for, you can change the track assignments to play the song correctly.

General MIDI (GM), the latest standard for MIDI synthesizers and tone generators, makes it much easier to play SMF songs without any of that tinkering. The most important feature of a General MIDI instrument is that it uses a standard program number to select a particular instrument sound. For example, selecting program 1 on any channel of a GM instrument chooses an acoustic piano sound for that channel, program 34 selects an electric bass, and so on. PC sound boards which meet the MPC specs are required to use the same General MIDI program-number assignments when playing under MIDI control.

Getting all the synthesizers from different manufacturers to play the same instrument sounds is a big step forward for users, but General MIDI goes even further. Not only do all GM instruments set aside MIDI channel 10 for drum notes, but GM's format also defines the channel 10 drum map. Each keyboard key selects a different drum sound rather than a different pitch — sending a note-on message for a low C note plays the kick drum, D plays a snare, D-sharp simulates a hand clap, and so on.

General MIDI also extends the basic MIDI standard by fixing the parameter numbers of the most common controllers, including modulation, volume, stereo position, and the sustain pedal or slider. Most keyboards have these controls, and most synthesizers can respond to them, but it's always been difficult to use them in a generic MIDI file, since they had different parameter numbers in different instruments. With the numbers fixed, a composer can use these controls in a sequenced song file, knowing that they'll play correctly on any GM instrument.

There's another new standard that's quite similar to General MIDI — Roland's GS standard. GS is a superset of General MIDI, so that all GS instruments are also GM-compatible, although the reverse usually isn't true. The GS specs list even more standard instrument sounds and more standard parameters than General MIDI.

A NEW CRESCENDO

When it comes to making music with computers, PCs got to the party pretty late. MIDI interfaces showed up on other computers much earlier. After a very modest start, the PC music world has made a giant leap forward in just a couple years. Today, PC sound boards are commonly used and well-supported. Most include MIDI ports, and the best of them give you a PC that puts the musical capabilities of any other type of personal computer to shame.

Windows 3.1's MIDI support means that nearly all of the best music software now runs on PCs. Recent additions to the PC library include pro-level programs like *Master Tracks*, a top-of-the-line sequencer from Passport Designs, and *Finale*, a somewhat cranky but extremely powerful notation program from Coda Music Software.

With the widest range of hardware and software to choose from, the PC is now an excellent platform for music. While the best computer in the world is no substitute for musical inspiration, the PC is now a powerful tool that can open up new vistas and provide countless compositional options.

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Multimedia. You've heard about it, and you're about to give it a try. You've got the bucks to proceed, but...wait a minute ...what exactly do you buy — and how do you put it all together?

To get on the multimedia bandwagon, you need a CD-ROM player, a sound card, and Microsoft Windows 3.1. Sounds easy enough, right? But if you've done any homework at all, you've no doubt encountered discussions about SCSI, MIDI, special drivers, and so on.

You could purchase all the pieces individually, just as you might have done when putting together your stereo system. But there's a difference. Each component of a stereo system is built with standards — everything is guaranteed to work with everything else. Unfortunately, the technology of the much younger PC industry has only the most basic standards, and for the consumer, it isn't nearly as user-friendly.

Luckily, there are some popular routes out of this particular hi-tech jungle. Two California companies, Media Vision and Creative Labs, have some very elegant solutions. Each company has bundled everything you need for multimedia in one nice package. Pick up any one of their kits and you're instantly into multimedia, with very few worries about compatibility or installation.

Creative Labs and Media Vision are two of about a dozen companies offering multimedia upgrade kits, but we feel that, dollar for dollar, their lineups are hard to beat. Both companies issue quality products, with extremely competitive prices, and they have excellent support and wide availability through either retail channels or mail order.

THE LINEUP

Media Vision offers three kits. The least expensive, the Media Vision Multimedia PC Upgrade Kit Plus, has a suggested retail price of $895, and includes the ProAudio Spectrum sound card and a Sony CD-ROM drive. For another $300, you can get the Pro 16 Multimedia Kit, which features the ProAudio Spectrum 16 sound card and an NEC CD-ROM drive, one of the fastest on the market. The third kit, which debuted this past September, is the CDPC. Featuring a fast NEC CD-ROM player, which looks like a kind of art-deco VCR, the CDPC kit also contains the ProAudio Spectrum 16 sound card and speakers. It has a suggested retail price of $1295. For another $179, you can add sub-woofer speakers and blow away your neighbors.

The Multimedia PC Upgrade Kit Plus, Media Vision's most affordable bundle, includes the ProAudio Spectrum sound card, a Sony CD-ROM drive, and a variety of CD-ROM titles.

All three kits include a variety of CD-ROM software packages: *Compton's Multimedia Encyclopedia*, *King's Quest V*, *MacroMind Action* (multimedia presentation software), and *Nautilus* (a multimedia magazine). You also get Microsoft Windows 3.1 and other programs on floppy disk. The Pro 16 kit adds the multimedia version of *Lotus 1-2-3*, and a MIDI kit is available for additional cost.

Creative Labs also has three upgrade kits available. The full Multimedia Upgrade Kit consists of the Sound Blaster Pro sound card, a CD-ROM drive, and a MIDI interface with sequencer software for a suggested retail price of $799.95. Take away the MIDI interface and some of the software (see below), and you have the Multimedia Starter Kit, which has an SRP of $649.95. For those who already own a Sound Blaster Pro, the CD-ROM Upgrade Kit provides you with a CD-ROM drive and a smaller number of software titles. This package carries a $549.95 SRP.

The full kit offers the widest range of software, and it's an impressive list indeed: Microsoft Windows 3.1 on CD; the multimedia version of *Microsoft Works for Windows*; *Microsoft Bookshelf*, which features a host of reference materials, including an encylopedia, dictionary, atlas, almanac, and quotation books, each with graphics, sound, and animation; *MacroMind Action*, *Authorware Star*, and *Tempra*, three different tools for creating multimedia presentations; and *Sherlock Holmes, Consulting Detective*, one of the best products available for showing off your multimedia system.

So which do you choose?

Media Vision's most recent addition to its upgrade-kit line is the CDPC. It includes a sleek NEC CD-ROM player, ProAudio Spectrum 16 sound card, speakers, and several CD-based titles.

Basically, it's a toss-up. The Sound Blaster Pro card provides the greatest software compatibility of *any* card on the market, so it tilts the decision in favor of Creative Labs. So does

NEIL RANDALL

With upgrade kits, one price gets you everything you need, and all the components — hardware and software — have been designed to work together.

the bundled MIDI interface and the wider software selection, available in the full kit. But the CD-ROM drives bundled in Creative Labs' upgrade kits use a proprietary interface, which means that they rely on the Sound Blaster Pro card to work.

The Sony drive in the Media Vision kit is sleeker, and the NEC drive in the Pro 16 kit operates under the SCSI (interface) standard. The Pro 16 kit also gives you an advanced sound card. Finally, Creative Labs' kits are less expensive than those from Media Vision, and, for many folks, money is often the final arbiter. If that's not an issue, give some serious thought to the higher-ended CDPC, which has the added benefit of being the easiest of the lot to install.

THE FASTEST WAY TO CATCH THE NEWEST WAVE

The most complete bundle in Creative Labs' lineup is the Multimedia Upgrade Kit. Besides a CD-ROM drive and Sound Blaster Pro sound card, it comes with a MIDI interface (with sequencer) and a wide range of software.

ALL IN AN EVENING'S WORK

One decision you'll need to make before purchasing an upgrade kit is whether you want an internal or an external CD-ROM drive. Of course, you'll need an empty drive bay for an internal CD-ROM player — if you don't have one, or if you're not willing to sacrifice one of your floppy drives to create a bay, then you'll need to come up with a few more bucks for the external version.

If you're installing an internal drive, you'll have to take the face plate off the empty drive bay. If you have no empties, remove your 5.25-inch floppy drive, making sure it doesn't carry an A: drive identity (if it does, you'll have to rename your B: drive to A:, which means getting into your computer's setup program). Then it's a matter of finding a power cable to go to your drive, and mounting rails to screw onto the sides (ideally, you should get mounting rails that fit exactly, but the kits contain generic rails). Insert the sound card into an empty 16-bit slot, then run the CD-ROM cables (one for data, the other for sound) from the drive to the sound card. Replace your computer cover, boot up, and use the installation software from the floppy disks. The upgrade kits contain complete instructions — be sure to read them before embarking.

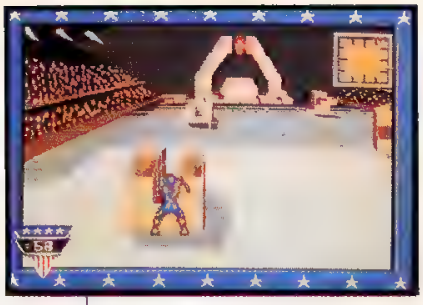
Give yourself an evening to get it all done. It can take as little as 45 minutes, but don't rush yourself. Besides, you'll need some time to actually play with your new toy, and to call up some friends and show them how hi-tech you've become. On the other hand, if you're nervous about opening your machine in the first place, you might want to ask a qualified service person to do the installation for you. You'll have to spend a few bucks, but it might be worth it for the extra comfort.

Multimedia is exciting stuff, but it also costs money. The nice thing about these upgrade kits is that one price gets you everything you need, and all the components — hardware and software — have been designed to work together. (Note that all prices mentioned in this article are suggested retail prices — stores and mail-order firms offer substantial discounts, so shop around.) If you're just starting out on the multimedia path, it only makes good sense to give these kits serious consideration.

For more information, contact: Creative Labs, 1901 McCarthy Blvd., Milpitas, CA 95035, or by phone at 408-428-6600 or 800-998-LABS; Media Vision, 3185 Laurelview Court, Fremont, CA 94538, or by phone at 510-770-8600 or 800-845-5870.

GP

American Gladiators

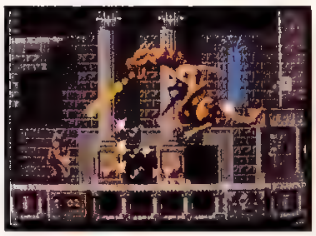


Based on the off-the-wall TV show of the same name, this **Gametek** title lets you play through a series of events geared to those fond of hand-eye challenges. Graphics and animation are nicely done, and the events, like those in the TV show, are varied. Each contest is timed, which adds a little drama.

If you're a real pro at arcade-style games, you'll be disappointed — but younger players and fans of the TV extravaganza can find a lot to like in *American Gladiators*.

Gods

This **Konami** title, developed by the U.K.'s highly respected **Bitmap Brothers** (a.k.a. **Renegade**), is an exceptional blend of action, strategy, and puzzle solving. In the role of an ancient would-be hero, you battle your way from the outskirts of the city, through the temple, the labyrinth, and the underworld.



And *Gods*, with its Greco-Roman mythological setting, is as challenging as it is beautiful. The graphics are gorgeous, and the animation is finely detailed. The soundtrack, like the game, is first-rate.

Magic Pockets

Konami and the **Bitmap Brothers** followed up the action-packed *Gods* with this platform game designed for a younger audience. While kids may like the cute theme and funny manual, even adult arcade fans will have their hands full with this one.

There's certainly no new ground broken as you travel through the 26 levels of Pocketland: you earn power-ups, special weapons, magic potions, and extra lives, just like many other arcade titles. But the graphics are endearing, the soundtrack is good, and the game holds a fair amount of strategic challenge. Check it out.

Out of This World

Despite its low-res, 16-color graphics and intermittent soundtrack, *Out of This World*, an action-packed puzzle adventure from **Interplay**, comes closer than perhaps any other PC game to the concept of interactive cinema.

Armed with a laser pistol, you try to work your way through a huge maze filled with all kinds of enemies — there's plenty of white-knuckled action. The game's smooth, convincing animation and impressive use of cinematic techniques have garnered its developers, **Delphine Software**, an abundance of well-deserved kudos.

AIR BUCKS

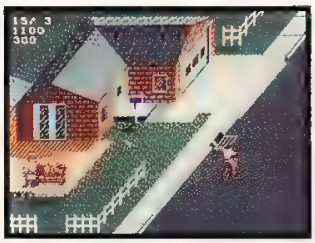
BUILD YOUR OWN AIRLINE EMPIRE

Impressions

Committed to Excellence in Strategy Entertainment

Paperboy 2

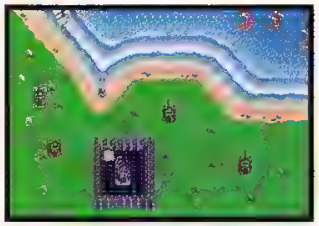
Paperboy was a coin-op hit that made its way to almost every computer and videogame platform. Its sequel is several measures better. The premise of the game is identical to the original: Deliver newspapers to your subscribers while warding off threats and avoiding obstacles. But a lot's been added and improved upon — better scrolling, more bonus rounds, and new locales.



Activision has done a nice job bringing charming graphics, fluid game play, a good soundtrack, and a variety of thoughtful extra touches to an old favorite.

Rampart

Another translation from the arcade and videogame world, *Rampart* is a throwback to times when games were simple in concept and graphics. *Rampart*, from **Electronic Arts**, is addictively appealing to those who like strategy with a large dose of action.

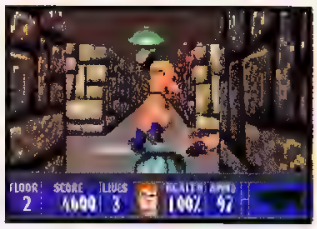


In short, players must defend their castles while blasting at each other. The real challenge is in quickly repairing damage to your fortifications before the next round begins. The one-player game pits you against a computer-controlled invasion fleet of ships. *Rampart* is both enjoyable and addictive.

Spear of Destiny

Soon after *Wolfenstein 3-D* appeared as shareware a while back, the verdict arrived: it was one of the hottest arcade-style games in years. Now comes **Formgen**'s retail version, *Spear of Destiny*, and it has all the hallmarks of the shareware version — incredibly smooth scrolling, lifelike sound effects, complex mazes, and an endless supply of enemies.

As a spy fighting your way into Castle Wolfenstein, you can expect blood to be spilled (a *lot* of blood), so players who object to graphic violence in a game should steer clear. With spurting blood and cries of anguish, *Spear* is not for the faint of heart.

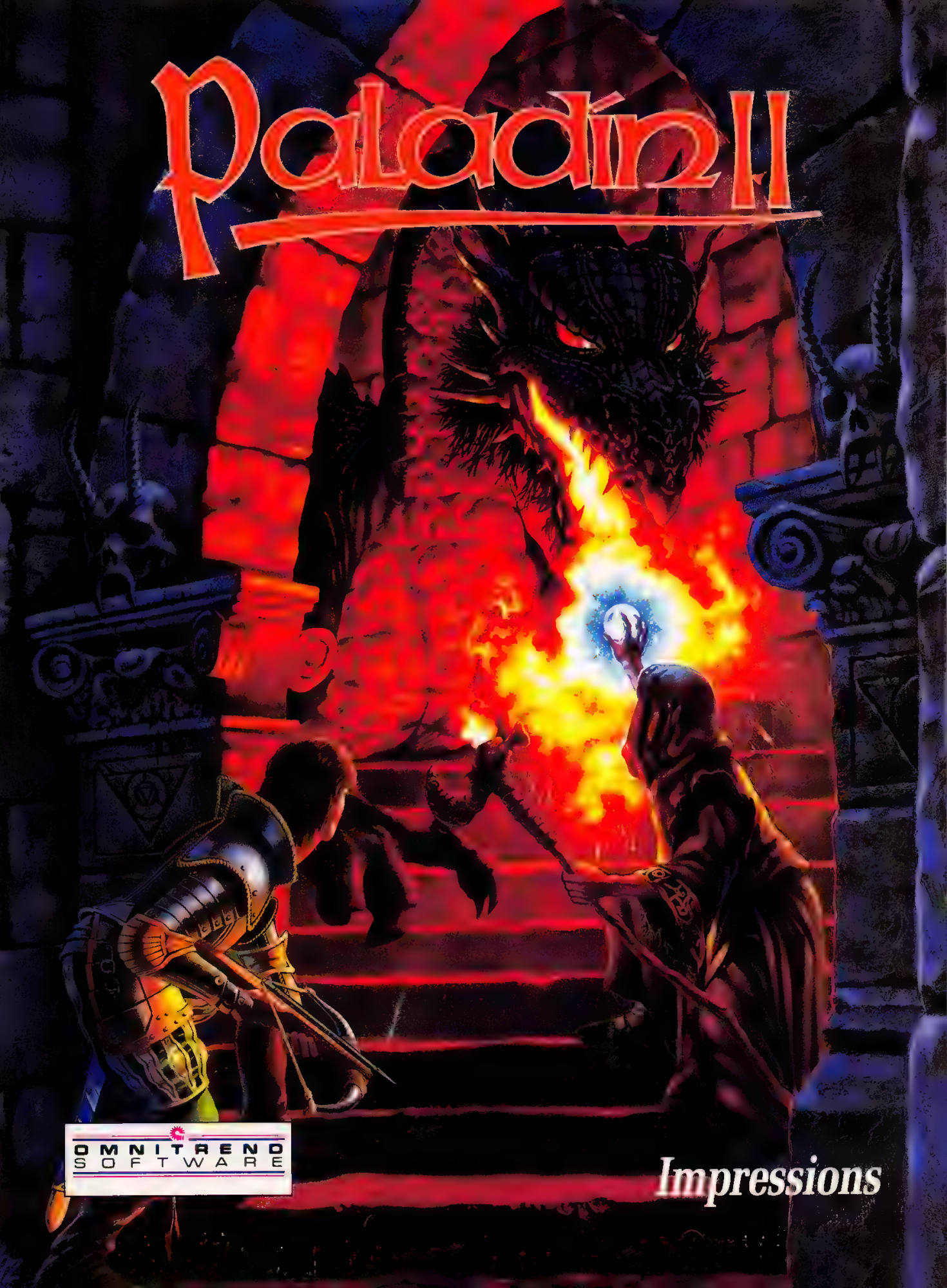


Teenage Mutant Ninja Turtles: Manhattan Missions

These unlikely heros have starred in dozens of games across every possible format. So what makes this one stand out? First, it offers solid play value, with a huge number of missions and a wide variety of enemies. Second, while its obvious appeal is for the younger set, *Manhattan Missions* is a lot of fun for adults — in short, it's a smart pick for the whole family.

Crisp graphics and a strong blend of arcade and strategy make this **Konami** title one of the best choices around for Turtle fans.

Paladin II



OMNITREND SOFTWARE

Impressions

Crusaders of the Dark Savant

Sir Tech's Wizardry, the oldest series in the FRP market, has entered the 90s with a handsome new look and a revamped gaming system. *Crusaders*, the latest installment, is a nonlinear game with a huge world to explore and a highly involved plot.

A great deal of emphasis is placed on interaction with NPCs, and diplomatic skills are as important as combat abilities. Veterans of the series will appreciate the new look and feel, and first-time fantasy role-players, with a little effort, have a treat in store.

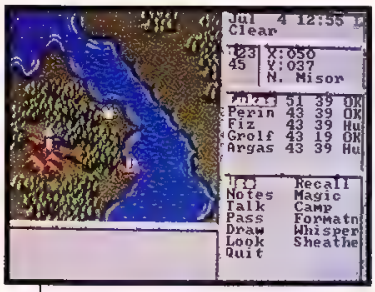
Darklands

With *Darklands*, sim-and-strategy giant **MicroProse** has pulled off a surprising coup by introducing something new in a cliche-packed genre. Their first FRP is a complex, captivating game set in Medieval Germany.

Darklands conveys what the citizens of this world at this time perceived it to be — so instead of the traditional spell points, scrolls, etc., of FRPs, the game deals with saints, alchemy, and even Satan and his minions. This game is engrossing and highly original, reflecting much careful thought and outstanding design.

Magic Candle II

For players tired of formulaic explore-gather-and-fight games, *Magic Candle II* is a refreshing breath of air. The game world is a wide-open, nonlinear affair that takes you from the island of Oschrun and into the sinister continent of Gurtex.



Mindcraft uses a flexible game system that allows players great freedom throughout, and the built-in automatic note-taking system is a great reference source when the plot thickens. *Magic Candle II* is a fascinating world worth exploring.

Might & Magic: Clouds of Xeen

Fans of the popular Might & Magic series should know that *Clouds of Xeen* is *not* an installment — it differs from the series in several important ways. *Xeen*, from **New World Computing**, is more graphically attractive, friendlier (with an improved interface), and easier to manage.

Xeen is a large game comprised of many small quests, all leading to a final confrontation. The game's elegant interface makes it a great choice for FRP newcomers, but its size and inventive design will appeal to veterans.

Discovery

IN THE STEPS OF COLUMBUS

In Discovery, *you* are the master explorer and adventurer: **Set Sail** into the distance, in search of new lands; **Explore** new worlds ; **Pirates** are everywhere - be prepared for sea battles; **Create Cities** -fell trees, build farms, forts, warehouses, schools; **Trade** the produce from your new world to buy new ships; **Fight** the other nations trying to establish their empire.

In 1492 Columbus discovered America - for God, Gold and Glory!

500 years later this is your chance to discover a new world!

FEATURES:

6 New Worlds to Discover

Piracy - mutiny & battles

Land & Sea combat

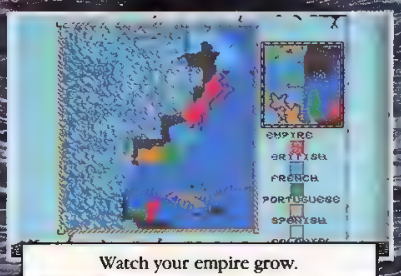
Simple point and click interface

8 ship types; 4 maps

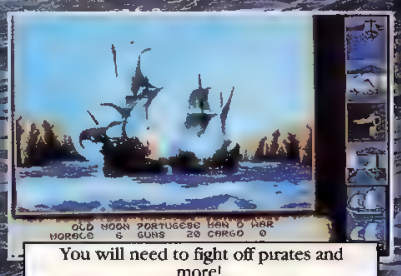
5 competing nations

YOUR CHANCE TO DISCOVER AMERICA!

Animated people develop buildings all by themselves.



Watch your empire grow.



You will need to fight off pirates and more!

Impressions

IMPRESSIONS SOFTWARE INC. 7 MELROSE DRIVE FARMINGTON CONN. 06032.

Prophecy of the Shadow

This SSI game's most enjoyable feature is its focus on exploration and storyline. Rather than butchering enemies, you spend time exploring, trying to find out what you're supposed to be doing. The more you explore and the more people you meet, the more clear your mission becomes — although there are several points where you'll be stumped.

Prophecy uses an overhead point-of-view and cuts away to a face-to-face digitized graphic of whomever you meet. All in all, it's a good game, despite a moderate frustration level.

Spellcraft: Aspects of Valor

Spells are a major component of FRP games, and they're the focus of this first fantasy role-play title from **AsciiWare**. While the graphics are spotty — beautiful and detailed in certain parts, but a bit flat and lifeless in others — *Spellcraft* offers a lot of game to sink your teeth into.

What the game does remarkably well is provide a spell-casting system in which the player can become highly creative, building spells from the ground up, much like creating a recipe. True FRP fans won't be disappointed.

The Four Crystals of Trazere

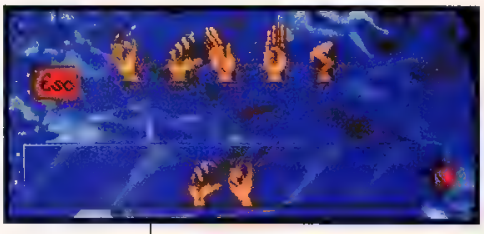
All of the standard FRP ingredients are here, but *Trazere*'s designers successfully avoided some of the genre's more complex and time-consuming conventions. From **Mindscape** via **The Software Toolworks**, *Trazere* is a visual feast that features an oblique three-quarter cutaway point-of-view. Animation is fast and smooth.

This game is a good example of an FRP that hits on all cylinders — it's clever, and it has a great deal to offer anyone willing to invest a little time in learning its gaming system.

The Summoning

A one-character indoors FRP from SSI, *The Summoning* boasts fine graphics, an innovative magic system, a decent plot, and intriguing interaction with NPCs. Unlike most AD&D games, not everyone you meet is intent on killing you.

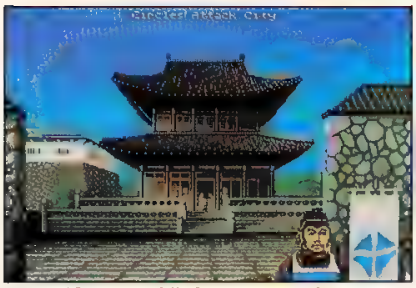
Developed by **Event Horizon Software**, *The Summoning* also offers options to print out both maps of areas you've visited as well as conversations you've had with NPCs. Although game play could stand to be a bit more lively, the plot is vast and quite original.



DON'T GET MAD...

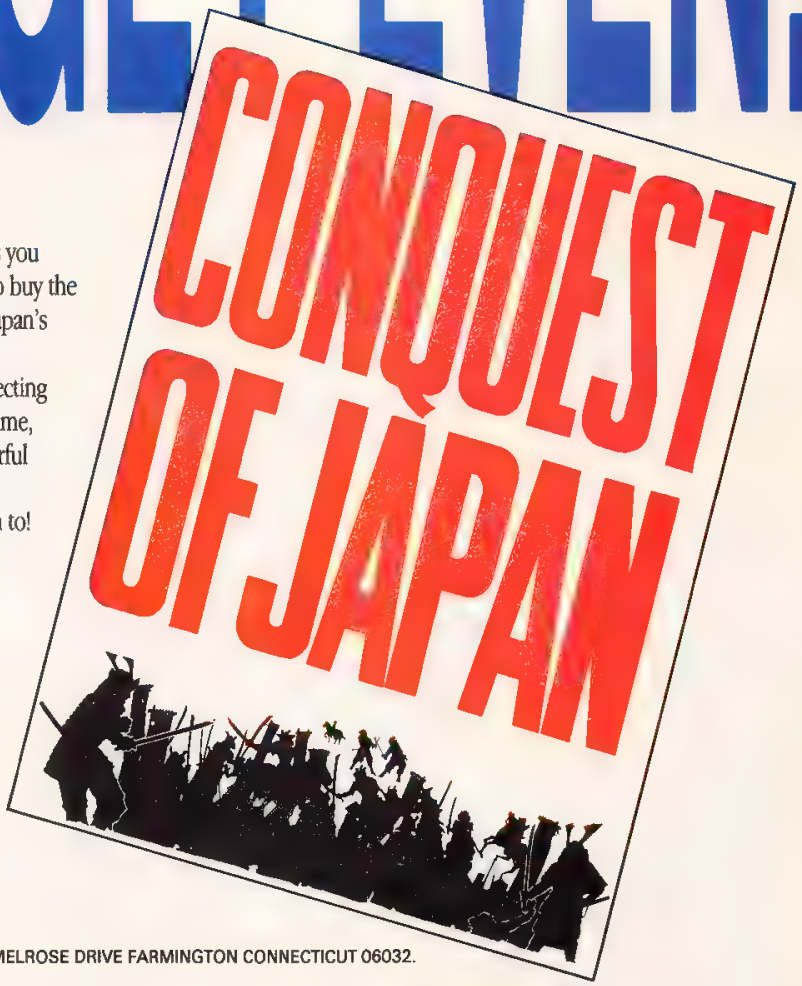
...GET EVEN!

Watch with pride as your warriors move into intricate formations (HIGH RESOLUTION mode IBM PC only).



The game is full of sumptuous graphics.

CONQUEST OF JAPAN



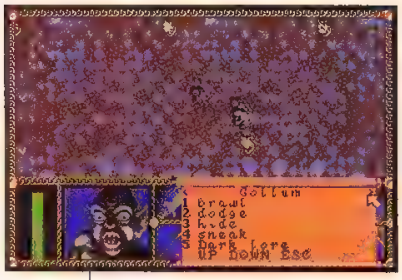
Your Chance to get your own back! Conquest of Japan gives you five cities, each with money to hire armies -it is up to you to buy the right soldiers, and direct your armies to conquer Honshu, Japan's main island! In a truly epic production, you are both the general,planning campaigns, and the army commander, directing troops within each battle. All battles are played out in real time, with your soldiers moving into formation in fantastic, colourful animation! You can become as involved as you like -from watching progress, to instructing individual men if you wish to! You can even choose to play each battle in Hi Res (386/25 machines or better reccommended) or faster Low Res.

FEATURES:

- *Miniature-style war simulation*
- *Cities located differently each game*
- *Choice of authentic troop formations*
- *Simple to play*
- *Your chance to conquer Japan!!*

Impressions IMPRESSIONS SOFTWARE INC. 7 MELROSE DRIVE FARMINGTON CONNECTICUT 06032.

The Two Towers

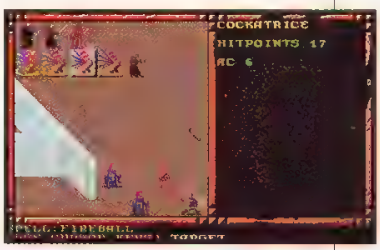


The second volume in **Interplay**'s Lord of the Rings series, *The Two Towers* continues the designers' faithful commitment to the spirit of Tolkien's work. The great challenge of giving players something to do without changing the plot of the literary work is met successfully here with a variety of subplot "games" that are fully Tolkienesque in nature.

The achievement of *The Two Towers* has been lauded by Tolkien fans, and as an FRP, it sets its own course, steering well clear of the "kill a monster, take the gold" cliche.

Treasures of the Savage Fontier

The follow-up to last year's *Gateway to the Savage Frontier*, this AD&D game has a lot to offer both FRP newcomers and veterans. *Treasures* clearly demonstrates that **SSI** is paying attention to evolving the interface, graphics, and gaming system of its AD&D line.



It's also clear from *Treasures* that the designers are interested in new approaches to plot. You begin with a bare-bones story, and must discover what's afoot — all this adds depth to game play as well as a greater sense of realism.

A time when the world seemed more fantastic and anything was possible!

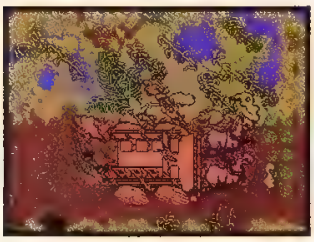
Journey back in time to the year 1957 on an expedition to the dark heart of the Amazon Basin. A desparate, crazed message sends you on a perilous search through a land where legends come to life, danger hides behind every corner, and incredible treasures wait to be discovered.

AMAZON is designed in the style of the serials of the 1940's and 50's such as Flash Gordon, The Lost City, and Rocketman.

These serials were made up of intriguing, fast paced episodes which placed the hero in unbelievable peril. AMAZON contains 14 exciting episodes filled with plot twists, mysterious characters and heart stopping cliff-hangers. You haven't had this much fun since the drive-in days!

Metal monsters seek your destruction!*

Ultima VII: The Blackgate



As the latest installment in **Origin**'s venerable series, *Ultima VII* is a whoppingly big game that's both highly complex and completely engrossing. Ultima author Richard Garriott (Lord British) has created his most realistic fantasy universe to date using the familiar landscape of Brittania. With 16 major areas of import, Brittania is a huge world with its own towns, communities, and particular population makeup.

Its beautiful and richly detailed world, coupled with the subtle dilemmas that are an integral part of an overall moral framework, make *Ultima VII* a groundbreaking game.

Ultima Underworld

Visually, this **Origin** game sets a new standard. Combining a finely rendered dungeon maze with superb animation, *Underworld* convinces you that you're really moving through corridors as you fight, think, and negotiate your way from level to level.

The automapping feature lets you focus on the task at hand: to liberate an experimental city built smack dab in the Great Stygian Abyss. And the mouse-controlled interface is superb. In the FRP category, *Ultima Underworld* is in a class by itself.

We're so sure you'll love our new multi-media adventure experience for your PC that we're willing to send you a FREE playable demo disk for just the $2 it takes to ship it to you! Call us now at 1-800-800-4880 to take advantage of this incredible offer.

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Battle for your life at the Bridge of Death!*

Pulse pounding excitement with full motion video sequences and synchronized speech.

They grow them big in these parts!*

Gasp in disbelief at the lost tribe of Amazon women!*

*Actual Amazon VGA screens.

Amazon

If you've played any previous adventures from **Access**, you'll feel immediately comfortable with *Amazon*. Just as in *Mean Streets* and *Martian Memorandum*, digitized graphics and voices are used to create a great sense of realism.

Set in 1957, the game puts you in the role of Jason Roberts, an idealistic college graduate who heads to the jungles of Brazil in search of his brother. *Amazon* is a wonderful sendup of old serial adventures, and should provide plenty of fun despite an initially awkward interface.

Cruise for a Corpse

This mystery game from **Delphine Software** (distributed by **U.S. Gold**) gives Sierra's *Dagger of Amon Ra* a run for its money. A traditional whodunit, *Cruise* puts you in the role of a detective trying to solve a murder which takes place on a Mediterranean cruise. Rather than searching every nook and cranny solving puzzles within puzzles, you question suspects and then use any information you gain to determine your next course of action.

Cruise is hampered by a few flaws (most notably a wearying copy-protection scheme), but for the most part it's intriguing, well-constructed, and inventive.

Dark Seed

Based on the artwork of H.R. Giger, this debut game from newcomer **Cyberdreams** has a look and feel unlike any other game on the market. *Dark Seed* can be frustrating at times — several problems must be solved through trial and error — but the plot of *Dark Seed* is compelling and urgent.

As novelist Mike Dawson, you discover that your constant headaches are caused by an alien embryo implanted in your skull. Unfortunately, you have only three days in which to find the aliens and send them packing. *Dark Seed* is quite difficult, and not recommended for beginning players.

Dune

Modeled on both Frank Herbert's novel and David Lynch's film adaptation, this **Virgin** release (created by French developers **Cryo**) does an excellent job of casting Duneworld as a setting for a graphic adventure.

As Paul Atreides, your main goal is to battle the evil Harkonnen empire, but you also must "green" the planet to make it more habitable. The strategy involved in assigning priorities to the game's various elements more than compensates for the somewhat linear game play, and the graphics are first-rate throughout.

Gateway

Legend Entertainment adapted Frederik Pohl's popular series of novels to its graphic-and-text adventure format, and the result is a wonderfully detailed game that's also highly playable.

It's 2101 A.D., and you've won a trip to Gateway — the jumping-off point for faster-than-light ships. Once there, you head out to destinations unknown in search of riches. With excellent EGA and VGA graphics and a good variety of puzzles and problems, *Gateway* is a big game with plenty of challenge.

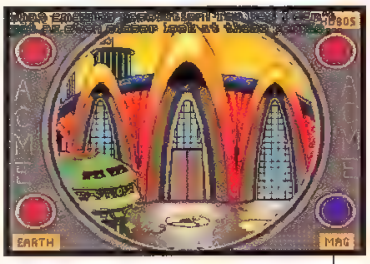
Indiana Jones and the Fate of Atlantis

The original story for this **LucasArts** adventure is top-notch, as the whip-wielding professor teams with psychic Sophia Hapgood to prevent the Nazis from using the secrets of Atlantis to rule the world.

The first and last thirds of the game are virtually the same, but the middle can be played with both Sophia and Indy (Team mode), as a solo-thinking game (Wits), or a solo-action game (Fists). The three vary greatly, giving the game great replay value. One of the best graphic adventures of '92.

Leather Goddesses of Phobos II

Activision's sequel to the Infocom classic is an amalgam of 50's B-movies: a friendly alien bringing word of the Leather Goddesses' invasion crashes in a Western town. The interface is smooth, and because you can't die or paint yourself into a corner, the emphasis is on logic rather than trial and error.

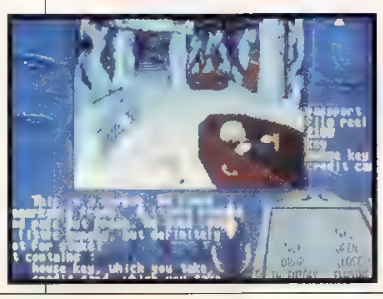


There are numerous lighthearted sexual innuendos, however, which compromise the 50's motif. And for a 15-meg game, *Phobos II* is rather short — an experienced player can play through without encountering any real sticking points.

Plan 9 from Outer Space

The Worst Movie Ever Made is the focal point of this game designed by **Gremlin** and published by **Konami**. The player is hired to recover missing film reels, and meets an assortment of wacky characters as he travels the world chasing clues.

The mouse-based interface resembles the one developed by LucasArts, and is just as easy to use. The graphics are nicely detailed, though compromised by a small viewing window. Overall, *Plan 9* is a solid game with enough challenge for even veteran adventurers.



Quest for Glory III— Wages of War

Wages of War firmly establishes the *Quest for Glory* series as one of **Sierra**'s strongest, with consistently excellent graphics, game play, and storyline. In addition, these Quest titles are the only Sierra games that let you import your hero—either a fighter, magician, or thief—from one adventure to the next.

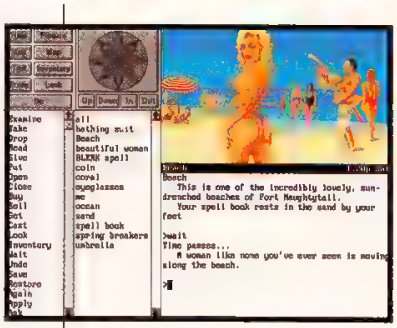
The advances in interface and graphics since *Trial By Fire* (the second game in the series) make *Wages of War* significantly better. If you've never tackled a Quest game, *Wages* is a solid play, even as a standalone.

Rex Nebular and the Cosmic Gender Bender

MicroProse's first graphic adventure is a hands-down winner. Though it undoubtedly takes its cue from Sierra's Space Quest games, *Rex Nebular* is more than a takeoff of that classic series. It's big, challenging, handsome, and absorbing, with an interface that reflects MicroProse's attention to detail.

As Rex, your search for a precious vase takes you to a planet where the Gender Gap has widened into total war. Some of the jokes and situations are a bit raunchy, but if that bothers you there's a Nice mode. This one is highly recommended.

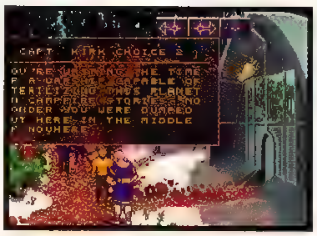
Spellcasting 301— Springbreak



In **Legend Entertainment**'s third installment of this hit series, nerdy wizard wannabe Ernie Eaglebeak and his frat buddies hit the skies to travel to Fort Naughtytail for some collegiate hijinks.

Beneath the sexual innuendos and sophomoric jokes, you'll find an excellent puzzle game that combines the best elements of text and graphic adventures. SVGA graphics make this the best-looking game to date from Legend. Hardcore adventure fans should get a kick out of *Spellcasting 301*.

Star Trek: 25th Anniversary Edition



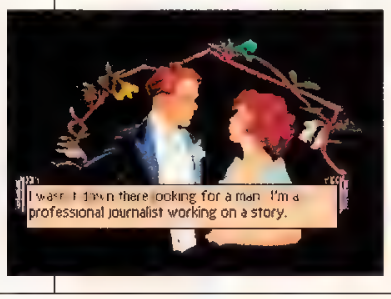
Doing a Star Trek game isn't easy: the slightest variation from the source is bound to annoy someone. But **Interplay** has done a great job of adhering to the spirit of the original series, right down to the ever-present tricorders and the expendable security officer.

In addition to shipboard and planetside adventures, there are some fiery space combat scenes as well. Purists may notice a bit of uncharacteristic dialogue, and may object to the occasional joke made at the series' expense. Still, even the most devout Trekkers should be pleased with this offering.

The Dagger of Amon Ra

Laura Bow, star of *The Colonel's Bequest*, heads to New York to become a journalist—and on her first assignment winds up in the middle of a string of murders.

The Dagger of Amon Ra from **Sierra** is graphically pleasing and boasts a terrific soundtrack, but there are several shortcomings. The point-and-click interface makes interrogation needlessly difficult, and the murderer is much too easy to spot. Playing *Amon Ra* can be a painstaking process, and your enjoyment probably depends on how meticulous and detail-oriented you are.



The Legend of Kyrandia

Distributed by **Virgin**, *The Legend of Kyrandia* is clearly aimed at fans of Sierra's King's Quest series. (Sierra brought legal action against Virgin for referring to King's Quest in the ads for *Kyrandia*.)

As Brandon, rightful heir to the throne of Kyrandia, you struggle to reclaim the kingdom from an evil magician. *Kyrandia* sports some of the richest 256-color VGA graphics we've seen, and as an added bonus, the game offers genuinely good humor. A thoroughly enjoyable and highly playable adventure from the creators of *Eye of the Beholder I* and *II*.

The Lost Files of Sherlock Holmes: The Case of the Serrated Scalpel

The first graphic adventure from **Electronic Arts** is a success in every respect. This is a massive game, but it offers between 30 and 50 hours of intriguing play.

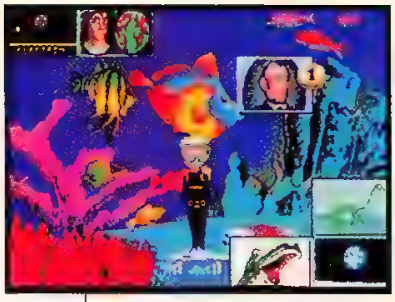
You explore over 50 beautifully rendered locations, and hear characters speak with authentic British accents via digitized speech. The non-linear format means you can search for clues in any order you wish, and the solution to the mystery, though difficult, is quite logical. A delight for mystery fans.

Waxworks

Horrorsoft, the group that developed both *Elvira* games, is back and bloodier than ever in *Waxworks*. In this full role-playing game from **Accolade**, you play the heir to a crazed uncle's wax museum, which holds the key to releasing your family from an ancient curse.

To succeed, you must slash your way through four separate "worlds" which are entered through wax exhibits. A cursed pyramid, a zombie-infested graveyard, a mind crawling with humanoid plant-monsters, and the fog-shrouded streets of Jack the Ripper's Victorian London are the battlegrounds for this stylish and satisfying horror game.

Facts In Action



A variation on the memory game Concentration, this **Spirit of Discovery** title does a nice job combining excellent visuals with a terrific soundtrack to simultaneously educate and entertain.

Facts in Action's four categories — World History, Basic Science, Spanish, and Prehistoric Animals — include 125 Q & A game tiles (more than 10,000 tiles are slated for release in the months ahead). In each game, the player selects one of 25 displayed tiles to match an audio clue. Correct answers animate the tiles. The only criticism: Some of the facts are fiction.

Follow the Reader

This impressive introductory-level reading program from **Disney Software** features familiar Disney characters, bright graphics, and terrific sound. Designed for preschool through first-grade children, *Follow the Reader* teaches word usage and sentence structure as well as values such as friendship, good nutrition, pet care, and ecological awareness.

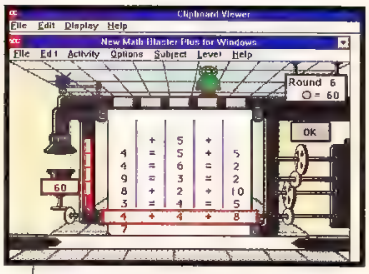
Kids help Mickey by making choices about what to do, who to talk to, and what to explore. While the program is a bit on the short side (there are 11 total screens), it's well worth the purchase price.

Mental Math Games

An outstandingly well-designed program that teaches basic arithmetic, *Mental Math Games* is comprised of five games, each unique and educationally sound. Designed by the **Waterford Institute** and distributed by **Broderbund**, it offers 355 levels of addition, subtraction, multiplication, and division problems. Each level addresses a different skill, with advancement to the next level allowed only after minimum requirements for both speed and accuracy are met.

With excellent sound, graphics, and animation, *Mental Math Games* gives students good reason to keep coming back to play.

New Math Blaster Plus for Windows

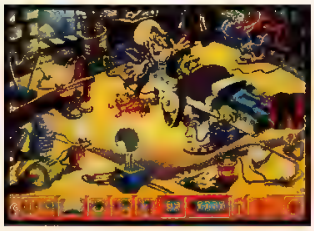


Based on the award-winning DOS and Macintosh product, this **Davidson** title, for ages 6-12, features 4 games, 6 levels, and 5 subjects. Besides standard math operations, the package teaches fractions, decimals, and percentages. Also included are a problem editor and an option for timed or untimed activities.

Games focus on accuracy or speed, and graphics are crisp and attractive. As a Windows 3.1-compatible program, *New Math Blaster Plus* features pull-down windows, mouse support, and it prints certificates using Windows printer drivers.

Quarky & Quaysoo's Turbo Science

Using outstanding graphics and a terrific soundtrack, this **Sierra** product teaches concepts and facts about science to students in the 11-15 age range. The game motif is a race, in which the player's goal is to advance through 20 checkpoints by answering questions correctly in a multiple-choice format. One of the game's strengths is its research guide, written very cleverly in kids' language.



It features easy and hard levels, and the program's huge database of questions almost guarantees that you'll rarely, if ever, get repeats. *Turbo Science* is a top-notch product.

Snoopy's Game Club

For ages 3-8, this **Accolade** program is a collection of three different games, all of the traditional sort. *Snoopy* is not a purely educational design, although it does teach logic and pattern recognition. A variety of play levels and other selectable variables covers a broad range of skills.

Where *Snoopy* really shines is in its sparkling graphics, adorable animation, and Peanuts-inspired music. This program isn't terribly original, yet it does justice to the quality of its license. It's a delight for the younger set.

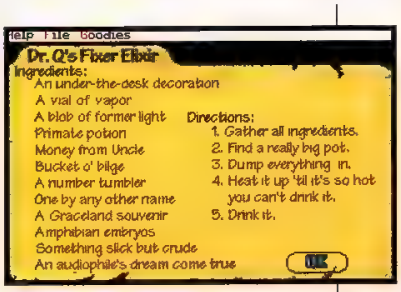
The Island of Dr. Brain

Sierra's sequel to last year's highly regarded *Castle of Dr. Brain* is an even better effort. The game still features three difficulty levels — novice, standard, and expert — but its novice level is much easier, making it more accessible to younger players. It's also more educationally sound.

The puzzle-filled adventure also includes more learning games, with subjects including fine art, foreign languages, basic physics, word play, genetics, and weights and measures. A greater number of random topics adds replay value on each skill level. It's much fun, and sure to satisfy a wide range of players and ages.

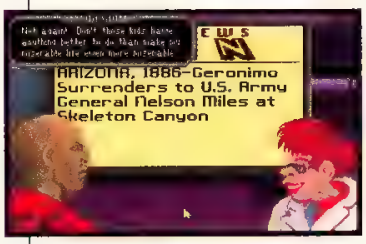
The Secret Island of Dr. Quandary

The challenges in this game are of the thinking-cap variety — jigsaw puzzles, memory challenges, and brainteasers. Each puzzle must be solved before you can get off a tropical island. The three difficulty levels offer different tests, so kids can graduate to new challenges as they play.



The educational content in **MECC**'s *Dr. Quandary* is decidedly on the lighter side, yet is does a nice job of making the child think hard while having fun. The three skill levels generally cover the 7-12 age range.

Time Riders In American History



This **Learning Company** title is part movie-script, part American history lesson, and all fun. The goal of the game is to unscramble historical headlines to find out Who did What, and Where and When they did it. The game includes more than 2,300 clues about 145 historical events and 114 famous Americans. The years covered are 1492-1905.

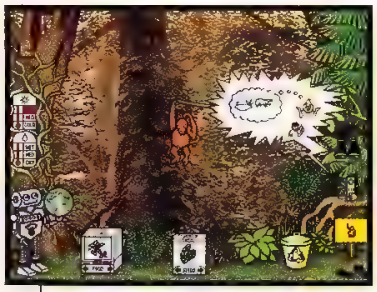
The game's scenario involves an evil Dr. Dread, a TimeLine machine, and several computer-controlled human friends whose help you must use. *Time Riders,* for ages 10 and up, looks and sounds as good as it plays.

Treasure Mathstorm!

Designed for ages 5-9, *Treasure MathStorm!* is another quality title from **The Learning Company**. While the premise is to break the freeze put on Treasure Mountain by the Master of Mischief, the purpose of the game is to build math and thinking skills, and to teach time measurement and money counting.

There's a generous dose of adventure and arcade action, and lots of charming little touches that appeal to younger kids. Attractive graphics, great sound, and an intuitive interface also help make *Treasure Mathstorm!* a good choice.

Zoo Keeper



For kids who like animals, this is the game. The child starts as Cage Cleaner and works his or her way up to Zoo Keeper by learning how to care for each animal with proper food, correct habitat, and appropriate temperature. Each of the 51 different animals is covered in great detail. **Davidson** also includes lots of info about endangered species.

The sterling soundtrack and stunning digitized art make this game highly appealing, but not at the expense of its outstanding educational content.

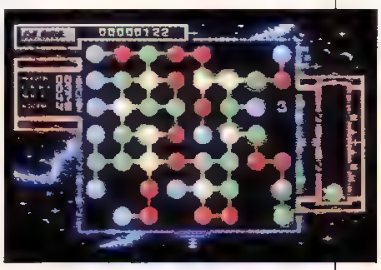
Zug's Race Through Space

Learning about the solar system was never this much fun. *Zug's Race Through Space*, a recent addition to the **ZugWare** line (via **Davidson**) is a learning adventure with remarkable graphics, combining colorful, cartoony 256-color scenes with digitized NASA photos.

The humor-laced *Race Through Space*, for ages 5-12, lets the child control Zug the dinosaur and help him deliver food orders across the solar system. Only one destination clue is given for each delivery. There are four difficulty levels (the fourth is *tough!*), and digitized speech throughout.

Atomino

This game puts an interesting spin on the concept behind *Tetris*: the object is to construct complete molecules from loose atoms thrown into the playing area. Although you're dealing with the bonding of electrons, there's no need to feel threatened — you don't need a Ph.D. to play this game. It's easy to get into, and there are two modes of play, each engrossing for different reasons.



Of course, the measure of any *Tetris*-style game is its addictiveness, and **Psygnosis'** puzzler ranks quite high on this scale.

Gobliiins

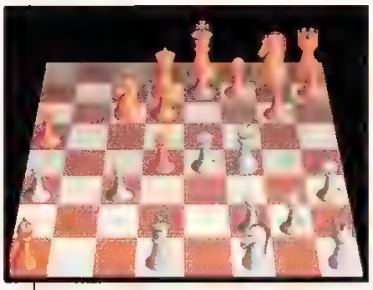
A French import from **Sierra**, *Gobliiins* is guaranteed fun. You control three goblins, each with a unique set of powers, as they try to locate a wizard and bring him to the castle to cure the tormented king.

Each game screen is an individual puzzle which must be solved before you can retrieve a valuable object and/or advance to the next screen. There are 22 screens in all, a bit short for hard-core puzzle gamers — nonetheless, *Gobliiins* intelligent design and good looks will hook you from the start.

Grandmaster Chess

Capstone claims that *Grandmaster Chess* is stronger than *Sargon V* or *Chessmaster 3000*, and backs up that boast with a money-back guarantee. (In our tests, *Grandmaster* indeed beat both those programs).

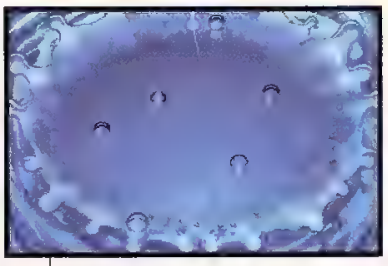
Grandmaster Chess doesn't have a teaching mode, so novices would probably do better with *Sargon V* or *CM-3000*. But *Grandmaster* has a unique "learning" mode — it "remembers" incorrect evaluations it has made and avoids them in the future. Experienced players looking for a solid program with excellent graphics and a very smooth interface will love *Grandmaster Chess*.



Heaven & Earth

Based on the teachings of Shambhala, a follower of Buddha, *Heaven & Earth* is designed to help an enlightened society transcend to a more celestial realm. In more earthly terms, the program is a challenging collection of mind games that require focus and concentration.

A product from Disney's adult-oriented **Buena Vista Software**, *Heaven & Earth* is an impressive achievement — but to appreciate it, you must be willing to invest the time and effort. If you're a hard-core puzzle-game fan, you owe it to yourself to try this one out — it's like nothing else on the market.



Hong Kong Mahjong Pro

At first glance, this game looks like a relative of the popular *Shanghai* program, but it's actually closer in play to gin rummy. Using the same kinds of tiles as found in *Shanghai*-style games, you must match and arrange them with a goal of collecting four sets. You start with 13 tiles selected from six sets.

Developed by **Nine Dragons Software** and distributed by **Electronic Arts**, *Hong Kong Mahjong Pro* is a lot of fun to play, and thanks to the excellent tutorial, even beginners can jump in quickly.

Incredible Machine

Think of a wacky erector set, and you get the general idea of **Sierra**'s *Incredible Machine*. Each level requires you to achieve a specific goal by constructing cause-and-effect contraptions. You can select from a wide assortment of devices, such as pulleys, levers, conveyor belts, and motors.

Features include timed play as well as single- or double-player modes. Each level — there are nearly 100 — is more difficult than the last, and you'll find yourself making generous use of the password feature. For those who like logic and problem-solving challenges, this game is a must-have.

Sargon V

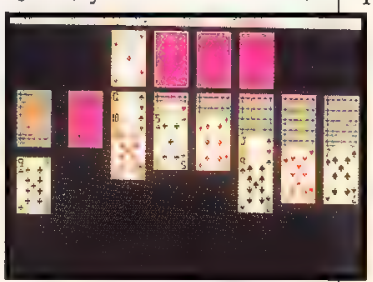
Activision's chess title isn't quite as challenging as *Grandmaster Chess*, but the vast majority of chess fans will find *Sargon V* more than strong enough to keep them playing for quite a while.

With annotative and illustrative games to sharpen various aspects of your game, *Sargon V* serves as an excellent chess mentor. Various play options allow you to fine-tune the game to your skill level, and the handsome graphics feature some amusing touches. This very functional and user-friendly program makes an excellent addition to anyone's chess library.

Solitaire's Journey

For fans of solitaire, this is one of the best — if not *the* best — games available. **QQP**'s *Solitaire's Journey* offers 108 different games, a variety of decks, eight kinds of tournaments, reverse moves, customizable screen colors, and more.

The optional play modes are fascinating. In Quest, you enter a house, "searching" each room by playing a solitaire variation and uncovering keys to locked rooms. The object is to find an exit. In Journey, you travel across the U.S., buying tickets for each leg of the trip with money earned by winning progressively.



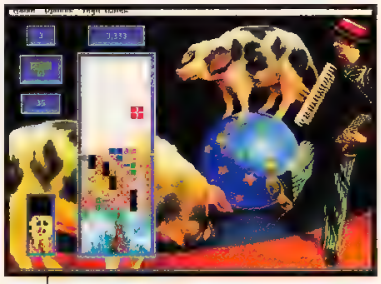
Stanford Wong Video Poker

Featuring a full range of video poker variations, *Stanford Wong* is both fun to play and useful to those about to take a jaunt to Las Vegas or Atlantic City. You can have the built-in tutor warn you whenever you fail to make a statistically unsound move.

Sound and graphics are uninspired, but **Villa Crespo** has concentrated more on practicality than aesthetics—and the variety of customizing options allows for lots of fine-tuning. Those in the market for card games or for some pro advice should pick this one up.

Super Tetris

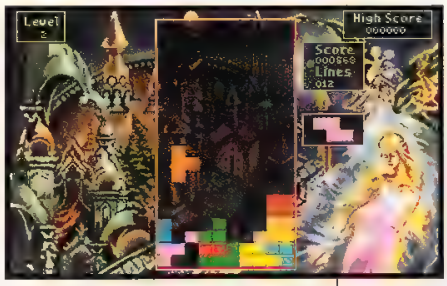
Just like its addictive namesake, *Super Tetris* is easy to play but hard to master. But unlike the original, the pit at the bottom of the screen is half-full of blocks when you start, and your job is to clear these out by plugging gaps in the rows. You also deal with time limits, restricted numbers of blocks, and bombs.



Ultimately, **Spectrum HoloByte** has given us a *Tetris* clone—but that's not bad. It not only clones the look and feel of the original, but also the fun and the challenge.

Tetris Classic

What makes this upgrade so appealing is not just its new suit of clothes — 256-color VGA graphics, new artwork, and a fine soundtrack—but its multitude of game variations. **Spectrum HoloByte** has included five different play modes that



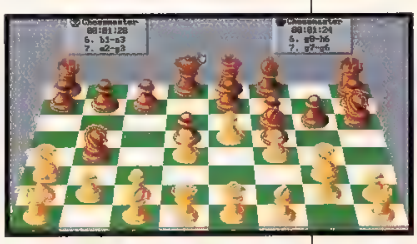
create a much broader challenge than offered by the original *Tetris*.

Art backgrounds and introductory musical score are thematically based on Alexander Pushkin's fairy-tale poem, *Ruslan and Ludmila*. As you progress, the screens change, telling the story of Pushkin's epic poem.

The Chessmaster 3000

Those who own earlier Chessmaster packages won't mind shelling out the loot for *3000*, whether it's the DOS, Windows, MPC, or MPC Pro version. Beginners can find teaching and hint modes, an interactive tutorial, and other friendly features. For advanced players, there's a library of 150,000 opening moves, a U.S. Chess Federation rating feature, a computer-opponent customizing feature, and much more.

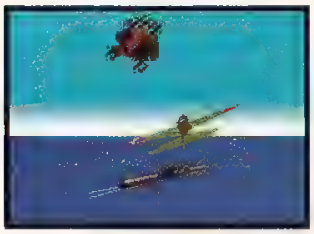
One of the most impressive features of this **Software Toolworks** product is the conversational English anaylsis of positions and hints on possible lines of play.



Aces of the Pacific

Dynamix follows its award-winning *Red Baron* with this incredibly broad simulation of air war in WWII's Pacific theatre. *Aces* features a huge variety of planes and missions, and, like *Red Baron*, almost every aspect of the sim is customizable.

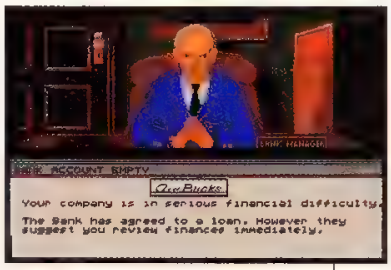
Aces was initially knocked for its slow frame-rate, but a patch from



Dynamix is supposed to speed things up by 15 percent, as well as fix numerous other minor bugs. If you have a 386/25 or faster, you'll want to give *Aces* a try. Its immense scope makes it a sim you can play, and enjoy, for a very long time.

Air Bucks

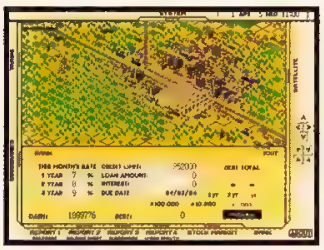
This **Impressions** release is very obviously patterned after *Railroad Tycoon*. From the game's "build a successful airline" premise to its instruction manual's histories of commercial air travel and aviation, *Air Bucks* mirrors almost every aspect of *Railroad Tycoon*.


BANK ACCOUNT EMPTY
Air Bucks
Your company is in serious financial difficulty.
The Bank has agreed to a loan. However they suggest you review finances immediately.

That's not to say *Air Bucks* isn't a good game. Although not quite as detailed as its land-based forbear, *Air Bucks* captures the free-wheeling, fortune-or-failure nature of entrepreneurial big-business. It challenges you to build a transportation empire and to keep it growing in the face of competition and an ever-changing economic model.

A-Train

Maxis took an old game called *Railroad Empire*, gussied it up with new graphics, and added a new interface to create *A-Train*. This simulation puts you in the role of CEO of a railroad company, with a goal of establishing a prosperous community through intelligent planning and investment.



Your duties include deciding where to lay track, selecting which trains to purchase, building stations, constructing residential and commerical buildings, and even playing the stock market. Though similar to MicroProse's *Railroad Tycoon*, *A-Train* is different enough that railroad buffs will want both games.

B-17 Flying Fortress

Unlike many flight sims, the focus of this **MicroProse** title isn't so much on a plane as it is on the crew that mans it. There's plenty of gunnery and bombing action, of course, but resource management — coordinating the actions of all the various crew

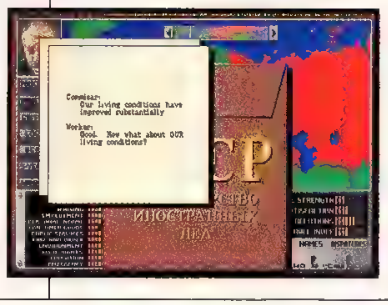
members — is the real key to success.

B-17 has a few bugs, but MicroProse has corrected them. Digitized speech and a custom crew designer would add greatly to the game's ambience, but even without these, *B-17* is a well-designed and unique simulation.

Crisis in the Kremlin

This sim takes one of the most significant events of this century, the fall of the Soviet Union, and dissects nearly everyone and everything that went into making 1991 a year for the ages.

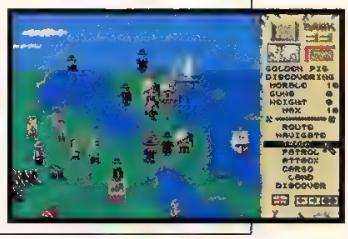
The game's strongest point, the abundance of information on the collapse of the USSR, is also its weakness — the info isn't always integrated into the game in the most usable fashion. Whether you choose to look at that as a flaw or as an accurate portrayal will probably determine your enjoyment of this **Spectrum HoloByte** game.



Discovery: In the Steps of Columbus

More a blend of exploration and resource management than an historical simulation, *Discovery* is an easy-to-learn, easy-to-manage affair that's loaded with options. You can choose from four different game objectives, represent any of several countries, select one of five unique worlds to explore (besides the New World), and more. Graphics are decent, and the point-and-click interface is smooth.

Despite the many variables in *Discovery* — competitors, finances, port maintenance, trading, combat, and much more — **Impressions** lets you get into the game easily and play without an annoying amount of micromanagement.



Heroes of the 357th

Heroes, from **Electronic Arts**, puts you in the cockpit of a P-51D Mustang as a member of the elite 357th Fighter Group. It boasts an incredibly fast frame rate — your plane literally screams past ground targets and enemy fighters — as well as an excellent variety of missions.

Heroes has several minor limitations. There's only one view from the cockpit, for example, and shooting down enemy fighters is bit too easy. But for players whose PCs aren't up to the hardware demands of other flight sims, *Heroes* delivers some furious air combat.

Sea Rogue

This **MicroPlay** title (developed by **Software Sorcery**) is difficult to characterize. It borrows elements found in RPGs, strategy games, software toys, and simulations to create a gaming experience that's both exciting and educational.

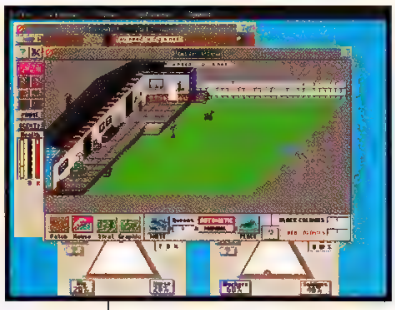
You start out as skipper of a rusty fishing trawler with a six-person crew and the coordinates of a sunken wreck. As you bring back booty from Davey Jones' Locker, you buy new equipment for your ship and training for your crew. *Sea Rogue* is vicarious archaeology at its best, with a loving eye to detail and a sure sense of history.

Shadow President

Who among us hasn't thought that we could do a better job than whoever is in the Oval Office? This simulation gives you the chance, but it also teaches you the dynamics of geo-politics while providing a richly entertaining gaming experience.

Accessing the huge database in this **D.C. True** game can sometimes give you a creepy sensation of having actually hacked your way into a secure government network. We're deeply impressed by the depth and richness of this game; it has a texture that's almost palpable, coupled with a handsome and extremely friendly design.

SimAnt



As a playground for anyone interested in science simulations, *SimAnt* is a worthy addition to **Maxis Software**'s lineup of "Sim" computer titles. You guide your ants as they try to survive and thrive. You're faced with many obstacles, from giant human feet to hungry ant lions. Search for food, build nests, raise young, and protect the Queen — you'll very quickly discover that being an ant is no picnic.

This is a superb simulation, packed with information. It's less a game than it is an exploratorium.

Stunt Island

This ambitious title from **Disney** puts you in charge of creating, performing, filming, and editing movie stunts. The possibilities are endless, thanks to a huge number of factors under your control — various aircraft, ground vehicles, and buildings can be filmed with up to eight different cameras, then special effects and editing can be added to create some spectacular cinematic sequences.

You won't master *Stunt Island* quickly, but the rewards are there once you learn your way around this program.

Tristan Pinball

Twenty years ago, only the most affluent pinball fans could afford their own machine. But now pinball addicts can enjoy *Tristan*, a simulation that synthesizes the most popular features of Bally, Williams, and Gottlieb classics.

Pinball fans will find *Tristan* about as intuitive as breathing, but **Amtex** has included a manual section on pinball fundamentals for beginners. There are other, fancier, pinball simulations on the market, but none that recreates the charm of the Golden Age of pinball with such loving fidelity. *Tristan* is a delight.

Al Michaels Announces Hardball III

The latest release in **Accolade**'s highly popular baseball-sim series, *Hardball III* features the digitized play-by-play calling of Al Michaels. But even without Michaels' voice, *Hardball III* is a top candidate for the most well-designed and playable sim in its class.

Graphically detailed, *III* features a variety of viewing perspectives. You can play by managing, creating leagues, editing player stats, or by just jumping right into arcade mode. Two new add-on products — a Players disk and a Ballpark disk — were recently made available.

Car & Driver

Ten classic cars, ten challenging tracks — it's a car enthusiast's dream come true. **Electronic Arts**, in conjunction with *Car & Driver* magazine, has put together the experience of driving some of the most famous cars in automotive history.

The game screens are presented in the same graphical format as the magazine, with complete historical background and full specs for each car. Tracks range from Route 7 in Arkansas to the J. R. "Bob" Dobbs Speedway, a fictional track emblazoned with the likeness of the prophet of the Church of the Subgenius. With a multitude of viewing perspectives and a wide range of customizing options, *Car & Driver* will get car enthusiasts all revved up.

David Leadbetter's Greens

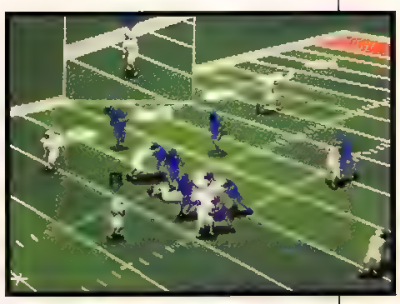
MicroProse's debut sports simulation is proof again of the care that this software leader puts into its products. At first glance, you might think that *David Leadbetter's Greens* lags behind *Links 386 Pro* and *Nicklaus*, and it's true that the VGA polygon-graphics in *Greens* don't match up in terms of realism. But *Greens* overcomes this by providing something unique — the first 3-D view in a golf game.

Multiple camera angles, a nice variety of courses, and a handicap that can only be lowered by completing rounds give *Greens* a high replay value. It's a must for PC duffers.

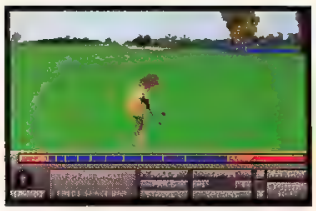
Front Page Sports: Football

The debut title in **Dynamix**' new Front Page Sports series, *Football* appeals to players of any interest level. The game is loaded with options that offer a wide range of control. You can play as quarterback at an arcade level; as coach, selecting from more than 200 stock plays or designing your own; or as general manager, drafting and trading players.

Teams are based on NFL cities, and real-life factors such as crowd noise, weather, and turf-type affect performance. *Football* offers a variety of viewing angles as well as digitized speech and sound effects.



Jack Nicklaus Golf & Course Design: Signature Edition



One of the most playable of 1992's plethora of golf sims, *Nicklaus* stands apart by virtue of its remarkable course-design feature. It's extremely easy to use, and you can play each hole as you design it, editing until you have a complete course.

The game comes with a helpful synopsis of Nicklaus's own philosophy for building courses, and two Nicklaus-designed courses, the English Turn Golf Club of New Orleans and the Sherwood Country Club of Thousand Oaks, California, are bundled with this **Accolade** package.battles in the laboratory.

John Madden Football II

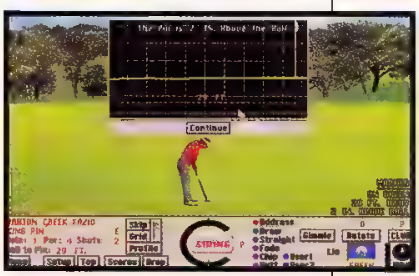
Designed with the pigskin strategist in mind — rather than the arcade fan — **Electronic Arts**' *John Madden Football II* is a feature-packed game, much improved over the original *Madden* PC title. The 81-play playbook is complemented by impressive editing capabilities, and everything from plays and players to entire leagues are customizable.

There's no NFL license here, although it's obvious that players and teams are based the 1990 season. *Madden II* isn't the definitive PC football game of its category, but it's a solid package.

Links 386 Pro

No sim does a better job than *Links 386 Pro* of duplicating the experience of playing golf on a real course.

Pro is the reigning king of realism, but it has the most stringent hardware requirements of any PC sim — you need a 386, SVGA graphics, and a bare minimum of two megabytes of memory. Expect gorgeous digitized graphics, terrific sounds, and detailed control over dozens of features. **Access Soft-ware**'s *Links 386 Pro* is a tour-de-force in playability, realism, graphics, and animation.



Michael Jordan in Flight

This three-on-three basketball sim uses a variety of advanced software techniques to produce a hoops game like no other. **Electronic Arts** spent several days filming Jordan in action, and all Michael's trademark moves have been digitally translated to the PC screen.

In Flight offers two play options: the more strategy-intensive Jordan mode (you control Michael) and the more arcade-style Ball-tracking mode (you control whoever has the ball). There's also a tournament option and a Video Edit Lab for creating a highlight reel.

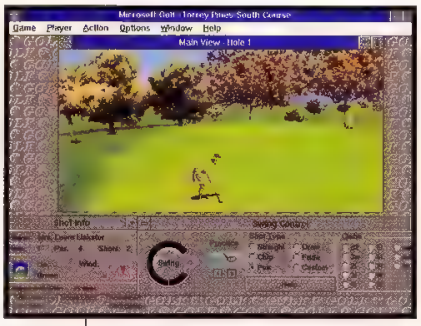
MicroLeague Baseball 4

It's not yet an all-star, but the fourth version of **MicroLeague Sports** *MicroLeague Baseball* is getting closer. Like its predecessors, it has few rivals when it comes to statistical detail and number-crunching capabilities.

Special features in *MicroLeague 4* include a programmable computer coach, a very nicely designed schedule editor, and

revamped graphics, which include live-action digitized video footage. The latter feature, unfortunately, draws from a limited repertoire. The game included the rosters and stats for 28 of the greatest teams of all time..

Microsoft Golf



Imagine *Links* running smoothly under Windows and you'll have a clear picture of **Microsoft**'s sports sim debut. There are a few nice enhancements to the original game: graphics support up to 640 X 400 resolution, choice of a male or female golfer, new sounds, and, most notably, the ability to place game-screen components — control panel, swing meter, main view, and top view — wherever you wish.

Microsoft Golf comes bundled with San Diego's Torrey Pines course, and is compatible with all of the DOS-based *Links* course disks.

NFL

This **Konami** game boasts every feature a PC football fan could want — an excellent statistical base, good arcade play, and lots of detail, from penalites and injuries to weather, post-season play, and off-season drafts.

NFL is licensed by the National Football League, but not by the NFL Player's Association, so real player names aren't used — but you edit names and attributes. *NFL*'s game options let you coach (call plays and watch results), play (control a single player for each down), or control the quarterback and subsequent ball carrier.

PGA Tour Golf for Windows

What makes this **Electronic Arts** game unique is its license with the PGA Tour — you can go up against 60 of the tour's best. *PGA* is delivered in a TV-like format, with announcer and a camera feature, which lets you view any hole from any angle.

PGA West Stadium - Hole 1 440 Yards, Par 4
Avoid the sand bunkers on the left or you'll have a tough iron shot to the green.
- Paul Azinger
Cam
Cam
OK

Four courses, all very challenging and each quite different from the other, are included. Graphics are not as detailed and crisp as those from the competition, yet *PGA Tour Golf for Windows* is one of the most comfortably playable golf sims around.

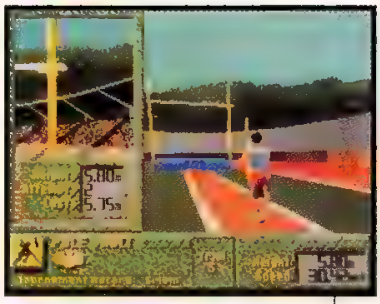
Road & Track Presents Grand Prix Unlimited

Grand Prix racing fans have a lot to like in this **Accolade** package. Nearly everything about the game is user-selectable, from the weather to the car you drive. It's no accident that the game is endorsed by *Road & Track* magazine — it's built around real Grand Prix tracks and circuits, and gives you actual Grand Prix drivers to race against.

The most exciting feature here is the Architect mode, where you can modify existing tracks or create new ones from scratch.

Summer Challenge

In this **Accolade** title, the world's finest athletes compete in eight contests of speed, skill, and endurance. You can square off against other players or computer-controlled opponents in Olympic events such as cycling, the pole vault, the high jump, and so on. All



Summer Challenge events are presented in excellent 256-color VGA, with digitized competitors and smooth character animation. This is a good-looking game.

If you're a track-and-field fan with a yen for the events of the Summer Olympics, you'll very likely enjoy *Summer Challenge*.

The Carl Lewis Challenge

Controlling a team of the world's top track-and-field athletes, your goal is the gold in five different events: the 100M Sprint, the 110M Hurdles, the Javelin Throw, the High Jump, and the Long Jump. You can train your athletes and let the computer determine on-

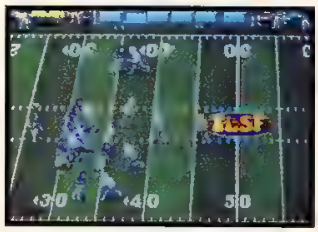
field performance, play in arcade mode, or select the full simulation and do both.

Graphics and animation are smooth, and the multiplayer option (up to three human opponents) is especially fun. The excellent features in this **Psygnosis** title breathe life into what could have become a simple arcade game.

Tom Landry Strategy Football

Though lacking an NFL license, **Merit**'s debut sports game is a real gem for hardcore pro football fans. The graphics and animation are excellent, and the teams (based on the 1991 season) perform realistically.

With over 1,000 offensive plays and more than 100 defensive alignments, *Tom Landry* really tests your knowledge of gridiron strategy. If a few enhancements were made — accurate depiction of weather, greater flexibility when blitzing, and more control over player assignments — *Tom Landry* would be the undisputed champ of strategy football games. As it stands, though, it's still an excellent choice.



Cyber Empires

This expand-and-conquer game from **SSI** pits the player against up to four human or computer-controlled opponents for the domination of a huge planet. Armies are composed of self-propelled cyborgs equipped with various types of armament and protection.

Three modes of play — Complete Campaign, Strategy Game, and Tactical Battle — give *Cyber Empires* a good deal of replayability. It takes a while to get used to the split-screen view in the Tactical and Campaign modes, but once you do you'll find the game offers a great combination of firepower and strategy.

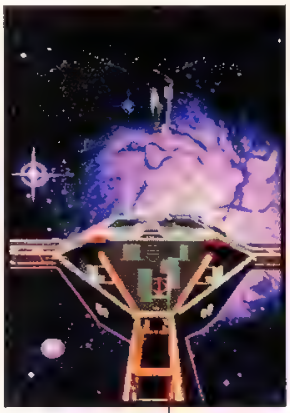
Floor 13

If you've ever wanted to run a shadow government within a lawfully elected democracy, here's your chance. Dispatch agents to follow citizens, have undesirables picked up and interrogated, even carry out sabotage and assassination.

If things go badly, cover your tracks by running disinformation campaigns against the opposition. *Floor 13*, from **Virgin Games**, is an unusual game, and quite humorless, yet it has genuine appeal for those interested in political intrigue as well as conspiracy theory enthusiasts.

Mantis

A space-combat simulation developed by **Paragon** for **MicroProse**, *Mantis* puts you in the cockpit of the XF5700 space fighter to battle the evil Siriens, insect-like aliens that have devastated Earth. Based on a space station, you and your elite comrades take on the enemy with cannons, missiles, and mines.



The graphics are stunning, the storyline is interesting, and the cinematic sequences add some interest to the plot. *Mantis* falls a bit short in the combat sequences, though, with encounters that are unquestionably fast and furious, but which don't require much tactical expertise.

Mega-Lo-Mania

With more than a passing resemblance to *PowerMonger*, *Mega-Lo-Mania* offers less detail, and focuses almost entirely on the struggle to invent and manufacture armaments. Although rather limited in scope, *Mega-Lo-Mania*, from **Ubi Soft**, is nonetheless an interesting and fast-paced strategic exercise.

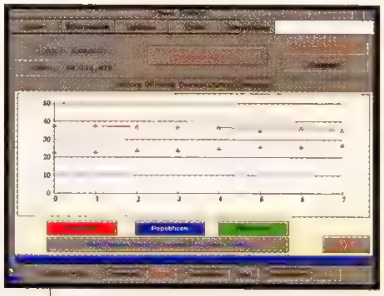
In the first stages, you'll battle with stones and wooden spears. Later, you begin to mine, build factories, and erect palace defenses. As each epoch passes, new technologies and scientific advances become available. Eventually you'll be planning your battles in the laboratory.

PowerMonger

With *PowerMonger*, the folks at **Bullfrog** (via **Electronic Arts**) have succeeded in matching the addictive nature of their first hit, *Populous*, while creating a fresh world and all-new challenges.

You play as a charismatic mortal leader, driven from your homeland by a seismic upheaval. Now, along with a few loyal followers, you come ashore on a new land. Determined to rule once again, you set about conquering villages and pressing the villagers into service. Played out against a landscape of incredible depth and detail, *PowerMonger* is an impressive and entertaining strategy game worthy of the Bullfrog name.

Power Politics



Cineplay's *Power Politics* for Windows offers an insider's view of the presidential election process. As your candidate's campaign manager, you plot a state-by-state strategy designed to put your man in the White House. You also have the chance to pit past and present candidates in a kind of "All-Stars" election. Could Clinton have kept Nixon from winning his first term? If you run a smart campaign, it could happen.

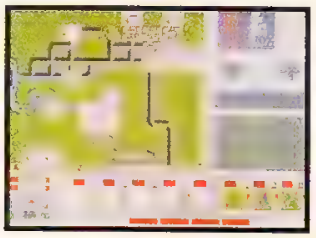
Although the national economic and political climate isn't as well-developed as we might like, the campaign dynamics seem right on target.

Siege

Mindcraft's siege game excels in nearly every crucial aspect. The micro and macro views let you stay on top of all strategic and tactical developments; animation and graphics are excellent throughout. And *Siege* provides you with a fine degree of control over not only the physical deployment of your various units, but also over the coordination and timing of various actions.

Some players may object to the presence of orcs, goblins, etc., alongside human warriors, but an editor lets you create armies comprised soley of humans. *Siege* is a masterful blend of strategy and tactics.

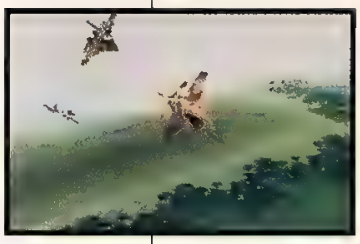
Star Legions



In this **Mindcraft** release, you play the role of a Krellan conqueror in charge of planetary invasion force...a very satisfying alternate existence, if you don't mind wiping out a few trillion humanoids along the way. Your first assignments will be easy pickings, but things quickly become more difficult.

Star Legions offers good, solid space-opera entertainment with just enough of a role-playing angle to add depth to all the bloodletting and city-nuking. Considering the nearly astronomical number of possible planets, and all the levels and types of challenges encountered during an entire career in the Krellan fleet, there's a lot of game here for the money.

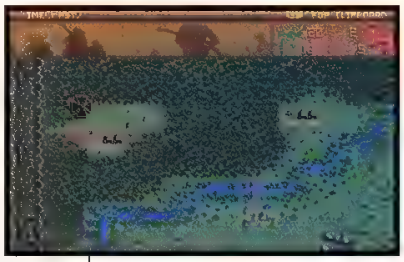
Strike Commander



Origin's long-awaited F-16 simulation is finally here, and it was worth the wait. Origin's RealSpace 3-D technology, combined with texture-mapped and gouraud-shaded polygons, has been used to create some of the most realistic graphics and animation ever seen in a flight simulator.

But *Strike Commander* is much more than a flight simulator. Set in the economic chaos of the early 21st century, the game puts you in the role of a mercenary combat pilot. With far more character interaction than either of the Wing Commander games, *Strike Commander* fulfills the promise of interactive cinema. If you own a 386 or better, you owe it to yourself to pick up *Strike Commander*.

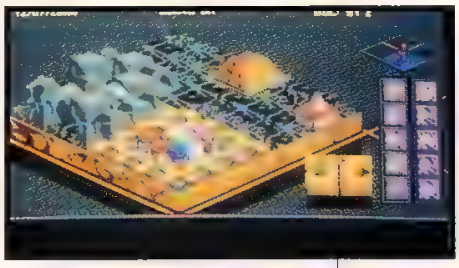
The Ancient Art of War in the Skies



Leave it to **MicroProse** to provide a refreshing change of pace from the recent spate of high-tech, super-sophisticated war games and flight simulations.

This game is definitely not a flight sim, but by deftly mixing arcade gaming and strategic planning, *Ancient Art*, based on WWI aerial combat, fills its own little niche in the market. It's comfortably placed somewhere between complex simulations and mindless arcade games. A beautifully drawn battlefield and clever sound support make it a visual and aural treat.

Utopia



Konami enters the *Populous* fray with *Utopia*. You're given total control of developing a planet, starting with only a few buildings, a hundred or so colonists, and a minimal amount of starting capital.

Hostile rivals forces add a tactical edge to the game, but constructing power stations, housing, factories, mines, etc., is just as important as winning battles. Your main goal is to create a viable city with a high quality of life; winning battles may make you proud, but it doesn't improve life for the little people under your control.

X-Wing

Based on the *Star Wars* movies and featuring space battles between the Rebel Alliance and the Empire, this **LucasArts** title ushers in several new technologies. A new proprietary story engine, dubbed Landru by LucasArts, was developed by Edward Kilham, *X-Wing*'s co-developer along with Lawrence Holland (*Secret Weapons of the Luftwaffe*).

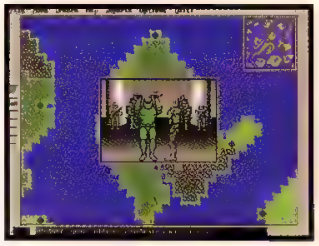
X-Wing involves combat action, strategy, and varying modes of difficulty. The 3-D flight engine integrates polygon and bitmap technologies to achieve a high level of detail and special lighting effects. Two add-on disks are already in the works.

Air Force Commander

A strategy-level simulation of aerial warfare in the modern Middle East, *Air Force Commander*, from **Impressions**, places sole emphasis for victory on air superiority rather than ground campaigns. *AFC* is not a hard-boiled, detail-intensive war game. Instead, its emphasis is on playability — and *AFC* is highly manageable, even with its blistering pace of play.

Careful planning and execution are required for victory, but the action can get almost overwhelmingly intense at times. *AFC* is a sensibly constructed and nicely designed effort, well worth your consideration.

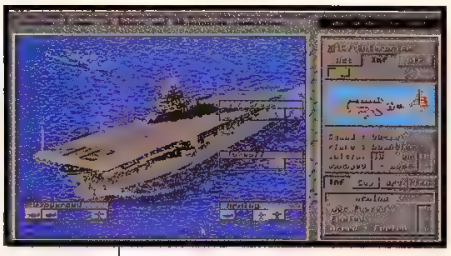
Battle Isle



The first war game from the respected French software company **Ubi Soft** and the development team **Blue Byte**, *Battle Isle* is a generic combat game based on the classic hex-grid system. It offers 32 different campaigns, all of them involving island terrain (some of it quite elaborate). Two human players can wage war against each other, or one human can do battle against a *very* tough computer opponent.

The only real flaw is the interface, which requires an awkward combination of joystick and keyboard for input. Otherwise, this is a solid achievement: easy to get into, hard to master, and handsome to the eye.

Carriers at War



The combination of beautiful graphics, detailed research, and realistic game play makes **SSG**'s simulation of carrier combat one of the premier war games on the market.

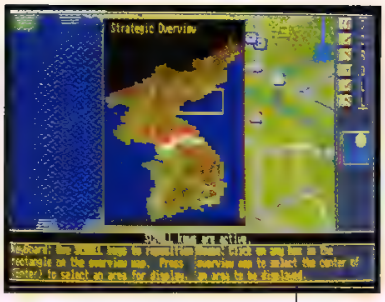
Carriers comes with six scenarios: Peal Harbor, Coral Sea, Midway, Eastern Solomons, Santa Cruz, and the Marianas. Each scenario offers you a choice of up to six task-force and land-based command slots. And it delivers all of the drama and suspense that you could hope for from a simulation of carrier battles. There's enough action to keep war gamers more than happily occupied for a long while.

Carrier Strike

This WWII naval-warfare simulation offers you the chance to fight some of the most important aircraft carrier battles of the Pacific Campaign. Published by **SSI** and designed by veteran games creator Gary Grigsby, *Carrier Strike* is among the best of a flotilla of recent naval combat games on the market, and is highly recommended.

The game manages to convincingly simulate battles ranging from the Battle of the Coral Sea to the "Marianas Turkey Shoot" of June 1944, with other stops along the way.

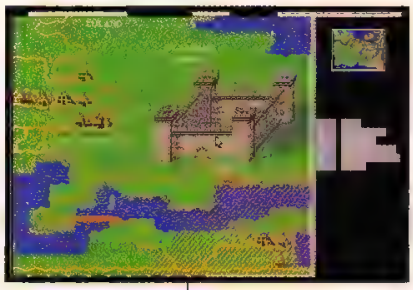
Conflict Korea



The Korean War has for some reason received little attention from computer war-game publishers, but *Conflict Korea* helps to address this void. The game does a solid, if somewhat dogged, job of re-creating the war's first, most dramatic year, and the four basic campaigns are first-rate war-gaming experiences.

However, **SSI**'s *Conflict Korea* is a game for the advanced player — novice war gamers would likely find it too tedious, and are advised to tackle something a bit less daunting for starters.

Conquered Kingdoms



Ready to lay siege to the castle of your friend across town? With the modem play included in **QQP**'s *Conquered Kingdoms* you can do just that. This war game, from the creators of *The Perfect General* and *The Lost Admiral*, pits gamers against human or computer opponents for control of a medieval world.

You can use knights, swordsmen, archers, wizards, ogres, dragons, and a host of other characters to conquer villages and castles. After maneuvering your forces, you watch animated battles as your grand strategy is carried out. Although game play is simple, the multiple levels of complexity and the variety of maps should keep players in the Dark Ages for a long time.

Global Conquest

One of the computer game industry's most respected designers is Dan Bunten, and *Global Conquest* may well be his most successful endeavor to date. By liberally borrowing concepts from every preceding "guns-or-butter" game, then mixing them with fascinating ideas of his own, Bunten has created a game of exploration and conquest that has both depth and replayability.

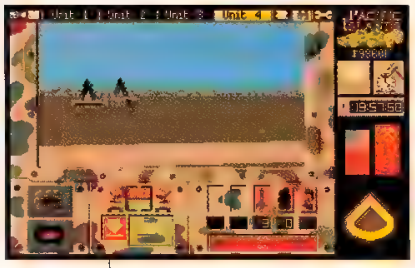
This **MicroProse** game does a wonderful job of sucking you into its universe, and is destined to be a classic. It's also packed with humor, but not at the expense of the game's intent.

Great Naval Battles: North Atlantic 1939-43

This is the most beautifully rendered war game **SSI** has ever produced, yet it doesn't feature sterling graphics and handsome packaging at the expense of historical accuracy. *Great Naval Battles* captures very nicely the sweep and majesty of capital ship combat on the high seas of WWII.

As part of SSI's Advanced Simulator Series, *Great Naval Battles* offers play at the Captain's View (ship) level, the Fleet View level, or the Grand Admiral View (strategic) level.

Pacific Islands



A sequel to the tank-combat simulator, *Team Yankee*, *Pacific Islands*, from **Readysoft**, attempts to combine some of the detail of a tank simulation with the playability and high-velocity thrills of an arcade game.

While the premise is admittedly loopy — North Korean-backed renegade Soviet communists seize a Pacific atoll — the action can be both exciting and complex. The scenarios are varied and interesting, but some of the game mechanics do get in the way. *Pacific Islands* is close, but not a direct hit.

Pacific War

Gary Grigsby's most recent game, published by **SSI**, is a truly impressive achievement, a simulation of WWII in the Pacific from start to finish. *Pacific War* doesn't treat this theater with broad brush strokes — instead it features the sort of exacting detail that's the trademark of a Grigsby design.

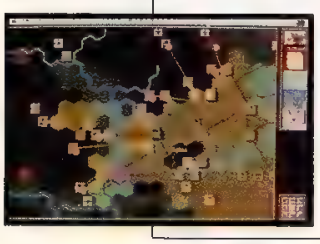
Pacific War omits or ignores very little; every ship from the stateliest carrier to the lowliest torpedo boat, along with every plane and squadron, is accounted for in the order-of-battle. But a clever system of assigning partial or complete control of certain functions to the computer makes a complex simulation much less intimidating than you might imagine.

Theatre of War

This is a truly different and startlingly original title in this category. While it's not every war-gamer's cup of tea, there's a lot to like.

You play on an undulating three-dimensional field populated by a variety of rounded pieces. More akin to chess than a traditional order-of-battle, hexagon-mapped war game, *Theatre of War* should be welcomed as a landmark achievement in strategic gaming that is exquisite in balance and rich in depth and subtlety. **Three-Sixty** has also done a remarkable job with the graphics and sound in this game.

V for Victory



Three-Sixty's long-awaited PC version of *V for Victory* features one of the finest war game engines developed to date. The game comes with *Utah Beach*, the first in a series of battlesets, and the battles are as white-knuckled and intense as any to be found in the entire PC war-game genre.

If you're the type of general who likes to micromanage every operation, you can play on that level, or you can select which routine functions will be performed by your invisible but loyal "staff assistants," leaving you free to attend to the larger rhythms of strategy. Graphically, *V for Victory* leaves nothing to be desired — everything is crisp, bright, and fine-grained. PC war

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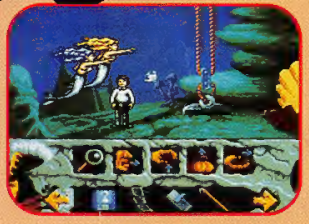

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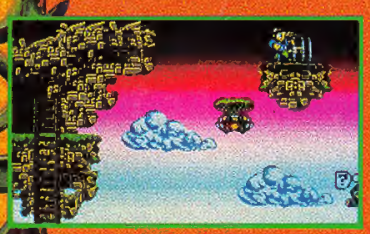

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